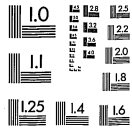
MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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Thomas A. Edison Papers

A SELECTIVE MICROFILM EDITION

PART IV
(1899–1910)

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Thomas A. Edison Papers
at
Rutgers, The State University
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START

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NOTEBOOKS BY EXPERIMENTERS OTHER THAN EDISON

The eight groups of notebooks (586 books) in this subseries cover the period 1899-1910. There are also scattered entries from later dates. Most of the books were used at the West Orange laboratory, although some relate to work performed at other locations, including the Edison Storage Battery Co. Among the Edison employees whose work is represented in these books are Ralph Arbogast, Alvin D. Caskey, Cloyd M. Chapman, Ignacy Goldstein, Walter E. Holland, John F. Ott, Ludwig F. Ott, John C. Shengle, and Francis R. Upton. The books contain occasional notations and drawings by Edison that indicate his attention to the work performed. The notebooks are arranged in the following order:

Group 1: Storage Battery Books (51 books)
Group 2: Storage Battery Endurance Tests (399 books)
Group 3: Cement (8 books)
Group 4: Cement House (34 books)
Group 5: Chemical Laboratory (40 books)
Group 6: Meters (7 books) [not selected]
Group 7: Phonograph Experiments (13 books)
Group 8: Miscellaneous (34 books)

Group 1: Storage Battery Books

The fifty-one extant notebooks in this group (two books have not been located) cover the period July 1899-December 1910. One book also contains entries from 1911-1915. The books were used by Edison employees, including Ralph Arbogast, Walter E. Holland, and Robert Rafn. Occasional marginal notations by Edison indicate his attention to their work. Included are test reports, notes about battery experiments, and research notes on printed sources and patent searches. Many of the experimental entries pertain to the various metals tried in Edison's storage battery; comparisons of early Edison batteries with those of competitors; the production of ingredients (such as the iron and nickel used in the cells); and the analysis of various components, including KOH electrolyte, iron and nickel powders, and hard rubber separators. There are also numerous entries relating to the evaluation of battery components and completed cells. These include tests of the resistance of nickel flake; electric vehicle road tests; and instructions for various battery discharge tests. Also included are scattered reports of endurance tests, which later became standardized and serialized into formal sets of endurance test books. In addition to the entries by Arbogast, Holland, and Rafn, the books contain notes by other laboratory employees, including Alvin D. Caskey, Zoltan de Horvath, George H. Hooper, Jr., George A. Meister, John O. Roos, and William A. Warren. Labels on the front covers of some of the books contain notes by Edison regarding the importance of the data contained therein. The notebooks are arranged in four subgroups: (1) General Storage Battery Books (32 books); (2) Chemical Analyses and Cell Tests (10 books); (3) U.S. Patents and General Literature Search (4 books); and (4) Foreign Patents Search (5 books).

Group 2: Storage Battery Endurance Tests

The 399 books in this group cover the period April 1903-December 1914, although there are several books with entries from as late as 1917. They were used by Edison employees, including Alvin D. Caskey, Ignacy Goldstein, Walter E. Holland, George H. Hooper, Jr., and Joseph W. Valentine, to record endurance and efficiency tests performed on storage batteries or to record testing conditions. There are many entries initialed by Edison, as well as occasional marginal notations by him, which indicate his attention to their work. Among the cells tested are experimental and production versions of Edison types A4, A6, A8, B2, B4, and E18, along with several competitors' cells. The tests pertain to variations in cell performance under different charge and discharge conditions and according to differing compositions or constructions of cells and cell components. Labels on the front covers of some of the books contain notes by Edison regarding the importance of the data contained therein. The notebooks are arranged in four subgroups: (1) General Endurance Tests (304 books); (2) Tube Tests (58 books); (3) TAE Reports (30 books); and (4) Goldstein Nickel Hydrate Books (7 books).

Group 3: Cement

The eight notebooks in this group cover the period May 1899-February 1903. They include entries by Francis R. Upton, Robert W. Rafn, and Cloyd M. Chapman; two books also contain notations by Edison. Five of these notebooks were used primarily to record a continuous series of 640 experiments pertaining to the milling of cement rock and to the desired composition of the mixed concrete, though at least one book is missing from the set. A sixth book contains a summary of some of the results obtained. Two additional books are by Chapman and contain notes on orders placed for the construction of kilns and other equipment, as well as notes on the development of bags for the storage and shipment of cement.

Group 4: Cement House

The thirty-four notebooks in this group cover the period July 1908-November 1910; one book has unrelated entries from 1937 regarding the dictation phonograph, or "Ediphone," business. The authors of the books are unidentified. Among the draftsmen who may have composed the books are J. Birkhahn, J. C. Hemphill, and H. B. Levinson. The experimenters involved in the cement house project include George E. Small and Henry J. Harms, Jr., mechanical engineers hired by Edison specifically for the project, and Robert A. Bachman, master machinist at the laboratory.

Group 5: Chemical Laboratory

The forty-one notebooks in this group contain routine reports of ore assays, chemical analyses, and other work performed in the chemical laboratory of the West Orange laboratory complex during the period April 1899-March 1913. They were used by many Edison employees, including Cloyd M. Chapman, Peter C. Christensen, and Ludwig F. Ott. Occasional notations by Edison indicate his attention to their work. Among the tasks reported are assays of copper, gold, iron, and nickel ores, as well as cement rock. There are also reports of quantitative and qualitative analyses of various materials and chemical compounds such as pig iron and soft coal, along with analyses of ingredients and components used for phonograph record blanks. There are some entries relating to the production of storage batteries, including analyses of the acid baths used to produce nickel flake for battery electrodes. The books contain a variety of other experimental and test reports, including one on the "preservation of horse dung." Entries in German are scattered throughout several of the books. In addition to the entries by Chapman, Christensen, and Ott, the books contain notes by other laboratory employees, including O. R. Foster, Horace W. Gillett, Otto Groethe, Henry S. Harris, Harold Kirschberg, Ross Phillips, Robert Rafn, John O. Roos, John C. Shengle, H. L. Shock, and F. W. Weber.

Group 6: Meters [not selected]

The seven notebooks in this group cover the period February 1899-February 1904. They were used by Edison employees P. F. Cowing, H. M. Phillips, John O. Roos, and Nils Traaholt. The entries in N-03-11-16, by Traaholt, are stamped by Frank L. Dyer. The books contain logs and experimental notes relating to meter tests, which were probably done for the Edison Illuminating Co. of New York. The meters tested are mechanical rather than electrolytic or electrochemical.

Group 7: Phonograph Experiments

The twelve notebooks in this group cover the period January 1900-January 1911 and are divided into three subgroups. They were used by Edison employees, including Ignacy Goldstein, Alexander N. Pierman, John C. Shengle, and Charles N. Wurth. Occasional notations by Edison indicate his attention to their work. The books also contain notes by other laboratory employees, including Peter C. Christensen, Paul S. Laverty, John F. Ott, Frederick P. Ott, and Martin A. Rosanoff. The notebooks are arranged in three subgroups: (1) Phonograph Records—General (6 books); (2) Phonograph Records—Shengle Books (3 books); and (3) Phonograph Recording and Reproducing Apparatus (3 books).

Phonograph Records—General

This subgroup contains general notebooks that focus on the chemical composition, hardness, durability, and molding of record cylinders and discs. The research documented in these books

ranges from tests of waxes and metallic soaps for cylinders to later work with shellac and other resinous compounds for discs.

Phonograph Records—Shengle Books

This subgroup contains notebooks that relate specifically to the work of John C. Shengle and his assistants in the chemistry laboratory of the West Orange laboratory complex. These books focus primarily on the chemical composition of record cylinders. Books 2-4 contain numbered experiments 666-1045. At the beginning of Book 2 are additional notes on a variety of chemical experiments and analyses dealing with ores, batteries, waxes, and acetylene. Book 1 has not been found.

Phonograph Recording and Reproducing Apparatus

This subgroup contains three notebooks regarding the phonograph machine itself and includes material on the improvement of recording and reproducing mechanisms. The first book contains two pages of notes by Frederick P. Ott on diaphragms. The second book covers the period 1905-1910 and was used by Charles N. Wurth, a long-time Edison employee, to describe his work on phonograph recorders, reproducers, and attachments, as well as the composition of records and the duplication of masters for record manufacture. Also included are a few experiments on a combined phonograph and motion picture device. The third book is from the Legal Department Records and pertains to the patent interference case, *Dennison* v. *Pierman* (no. 28,395). It contains Alexander N. Pierman's notes on a pneumatic amplifier, a device that is also mentioned in Wurth's notes.

Group 8: Miscellaneous Experiments

The thirty-four notebooks in this group primarily cover the period July 1900-July 1911, but several contain entries from as late as 1914. They were used by Edison employees, including Arthur H. Glaister, Walter E. Holland, and Ludwig F. Ott, and contain only occasional notations or drawings by Edison. The entries pertain to a variety of subjects. Included is a book by Cloyd M. Chapman providing details of his work on a dry placer process for gold ore concentration and several books by other authors on radioactivity. Also included are notes on tests of primary batteries; experimental notes pertaining to lamps, mining, metals, the "Edison effect," electroplating, oil filtering, and ore separation; and a few entries regarding photography and motion pictures. In addition to the entries by Chapman, Glaister, Holland, and Ott, there are notes by Alvin D. Caskey, George Hetherington, John F. Ott, and others. Two of the books, N-Undated.38 and N-06-11-21, contain rough drawings by Edison that appear to be unrelated to the contents of the books themselves; N-03-12-18 contains a loose note from Edison to Robert Rafn.

Notebooks by Experimenters Other Than Edison
Group 1: Storage Battery Books

The fifty-one extant notebooks in this group (two books have not been located) cover the period July 1899-December 1910. One book also contains entries from 1911-1915. The books were used by Edison employees, including Ralph Arbogast, Walter E. Holland, and Robert Rafn. Occasional marginal notations by Edison indicate his attention to their work. Included are test reports, notes about battery experiments, and research notes on printed sources and patent searches. Many of the experimental entries pertain to the various metals tried in Edison's storage battery; comparisons of early Edison batteries with those of competitors; the production of ingredients (such as the iron and nickel used in the cells); and the analysis of various components, including KOH electrolyte, iron and nickel powders, and hard rubber separators. There are also numerous entries relating to the evaluation of battery components and completed cells. These include tests of the resistance of nickel flake; electric vehicle road tests; and instructions for various battery discharge tests. Also included are scattered reports of endurance tests, which later became standardized and serialized into formal sets of endurance test books. In addition to the entries by Arbogast, Holland, and Rafn, the books contain notes by other laboratory employees, including Alvin D. Caskey, Zoltan de Horvath, George H. Hooper, Jr., George A. Meister, John O. Roos, and William A. Warren. Labels on the front covers of some of the books contain notes by Edison regarding the importance of the data contained therein. The notebooks are arranged in four subgroups: (1) General Storage Battery Books (32 books); (2) Chemical Analyses and Cell Tests (10 books); (3) U.S. Patents and General Literature Search (4 books); and (4) Foreign Patents Search (5 books).

Fifteen books in the first subgroup have been completely or partially selected. Partially selected books are indicated by a bracketed number noting the approximate percent of pages selected. The following categories were not selected: repetitive sets of battery tests, for which representative entries have been selected; analyses of battery parts, including quantitative analyses of battery solution and alloys; notes regarding preparation of nickel flake and iron; notes on the production of battery components such as electrode tubes; literature and patent searches.

N-Number	Inscription on Front Cover or Flyleaf

[additional information supplied by the editors appears in brackets]

General Storage Battery Books: Selected

99-07-17	"#1 Calculations"
99-11-24	"R[obert] Rafn"
99-12-15	"Galvanic Cells (Storage) #935 Dec 15 1899"
00-06-22	"Battery Experiments June 22nd 1900" [80%]
00-12-28	"Storage Battery Tests Dec 28 1900" [20%]
99-00-00.3	---
01-04-30	--- [50%]
01-07-19	"July 19th 1901 Rob[ert] Rafn" [20%]
01-08-12	--- [20%]
03-10-29	"Robert Rafn, No. 1" [60%]
04-08-24	"#1 - 371 Experiments W.E.H[olland]. 8/24/04 - 3/29/06"
04-11-18	"W.A. Warren" [80%]
06-07-08	"Notes, etc. Geo. H. Hooper, Jr. Electrical Engineer" [10%]
10-05-29	---
10-12-10	"Notes & General Instructions for Supervisors of Research Dept E. S. B. Co."

General Storage Battery Books: Not Selected

01-10-09	---
02-00-00.3	---
02-05-26	---
02-06-17	"Wm A. Warren Henry S. Harris"
02-11-12	---
03-02-04	"Jo[hn] Roos"
04-01-01	"Not Important"
04-07-21	"Storage Battery Experiments from July 21, 1904 to Foaming"
05-09-26	"Plating Solutions Caskey Sept 26-05"
06-01-17	"Zoltan de Horvath"
06-01-29.1	"Directory Large Cells"
06-08-08.2	"Caskey Plating Vol II"
07-07-22	"Resistance and Contact of Flake"
08-03-18	"Green & Iron Mix and flake for Tubes"
09-12-15.1	"Tests of Meters and Other Apparatus Vol 1 12-15-09"
10-01-26	"F[rederic C.] Raab"
10-12-00.1	"Rough Notes on Vehicle Tests and Polarization Expts."

Chemical Analyses and Cell Tests: Not Selected

04-06-01	"Labratory Bench Book R. A. From June 1st. 1904 to Feb. 1 - 1905"
05-02-01	"Labratory Bench Book Feb. 1 - 1905 to Mar. 30 - 1905. R. A."
05-03-31	"Labratory Bench Book Mar 31 1905 to June 6th 1905. R. A"
05-06-06.2	"Labratory Bench Book June 6th 1905 to #341- #424 R Arbogast Silver Lake"
Undated.11	"#425-534 Labratory Bench Book R Arbogast Silver Lake"
05-10-16	"#535 to #645 R. Arbogast. Silver Lake N.J. Silver Lake Edison Chemical Works"
[Missing]	[#646 to #754]
Undated.12	"755 to 858 inclusive Silver Lake"; "R. Arbogast"
Undated.13	"#859 to 1009 inclusive Silver Lake"; "R. Arbogast"
08-05-27	"#1010 to 1127 Silver Lake"; "R. Arbogast"
[Missing]	[#1128 to #1252]
09-07-25	"#1253 Exp. to #1351 inclusive"; "R. Arbogast"

U.S. Patents and General Literature Search: Not Selected

02-00-00.2	---
02-05-24.2	"Research of Patents on Batt[er]ies for E S Battery Co"
02-08-13.1	---
02-08-13.2	---

Foreign Patents Search: Not Selected

02-05-00.1	"E S Bat Co Patent Research"; "I. English Patents"
02-05-00.2	"Edison Storage B Patent Research"; "II Dingler's 'Polyt. Journal' & German Patents"
02-05-00.3	"E S Bat Patent Research"; "III French Patents"
02-05-00.4	"E S Battery Patent Research"; "IV. Miscellaneous"; "& Index"
02-05-00.5	"French Patents. V Supplement"

Notebook, N-99-07-17

#1

Calculations

7-17-99.

7.

Stage Battery

Lb. Blank - Electro Chem - '96

$PbO + 2H_2SO_4\,aq. + Pb = 2PbSO_4 + aq + 87000$

[207+32] 239

32,1
64
98,1

207.
196.2
3

239.
196.2
207.
327.0

196 / 588.6 (3=7 H_2O
54
36
326

969.2 gr = 87000 Col.

969.2 ft = 87000 × 1.8 = 156600 B.T.U.

18
696
522
969 / 1566 (1.62 B.T.U. per ft.

969
2970
5814
1560

162 / 2595 (15.7 ft per Pl. ha.

162
925
810
1150

15.7 × 523 / 969

15.7 = 1959
7785
9144
9863
9281 = 8.15

7-17-99 — 2

Storage Battery —

M. Accumulator Co. Cat. / '98

Type F —

19 Plates 10½ x 10½

8 hour disc. — at 90 Amp —

At 2 Volts = 8 x 2 x 90 = 1440 Watt hr =

750) 1440 (1.9 W. hr

750

690

675

15

Weight of each element 184 lbs

Weight of all complete with acid in lead lined tank 415 lbs

Weight of acid in lead tank 124

Weight of acid in lead tank alone 50% higher than glass jars —

1.9) 184 (97 lbs of element per W. hr

171

130

1.9) 415 (218 lbs of compl. cell per W. hr

380

350

190

160

1.9) 124 (65, lbs acid per W. hr

114

100

Tank outside 2.1/4 x 15 x 17 1/4 high

7-17-99

Type E.

15.

Plates ~~[illegible]~~ 7¾ X 7¾

Discharge 8 hrs at 35 Amp.

8 X 2 X 3.5 = 560 Watt hrs = .747 HP hrs

$$\begin{array}{r} 560 \\ \times .747 \\ \hline 3920 \\ 2240 \\ 3920 \\ \hline 418.32 \end{array}$$

Weight of elements 71 lbs

Rubber jar 8½ X 8½ X 11

Weight of acid in cupfer 21 lb

" " cell comp. with acid in water 91.

.75) 710 (94.7 lb element HP hr

675

350

300

500

.75) 21 (28 lb acid HP hr

150

600

.75) 91 (121 lb comp. cell HP hr

35

160

150

100

5 hr disc. at 49 amp. 121 X 7/9 = 138 lb comp cell per HP

5 hr disc. at 70

121 X 7/9 = 161 lb per HP hr

7-17-99.

Edwin Leland —

Thermal effects —

Formation of Zincate left out —

ZnO = 85400. Zn = 65.0 Cu = 63.4

CuO = 37100 Cu O = 79.4

48300

65 | 79.4 (1.22 — Therm. for 1 lb. Zn —

65

794

130

130

2545 = 3.4056

453 = .6839 .1263

.7 = .2553

.9392

65 = .8129

.1263

2793 = 1.9 lb. of Zn per 1 lb.

1.9 × 1.22 = 2.3 lb CuO per lb Zn

1.9

38

19

2.318

2.3 + 1.9 = 3.2 lb acid per lb Zn

1 lb = 453.6 gr. —

Zn = 1.21 gr. Zn per hr —

1 lb Zn = 453.6 per hr

746 × 1.21 / 1.21 =

453.6 × 1.9 =

746 = .8727 1.9 = .2788

121 .8826 454 = .6571

.9555

.9359

.0196 = 1.04 Volts for cell —

Thermal Relations 7-17-99

CuN_2O_6 wet. 82.200

63.4
28.
96.
187.4

82.2 = 4.9149
1.8 = 2553
5.1702
63.4 = 1.8021
3.3681 = 2330

.1702
187 = 2718
.8984 = 791

8021
2718
5303 = 33.9% Cu

Cu, O, SO_3 aq = 55.960

~~9482~~

63.4
64.
32.1
159.5

56 = 4.7482
1.8 = 2553
5.0035
63.4 1.8021
3.2014 = 1590

.0035
160 = 2041
7994 = 630

8021
2041
5980 = 39.6%

Naumann

Cu, O, N_2O_5 aq = 52410.

187.4

524 = 4.7193
1.8 = 2553
.9746
63.4 = 8021
3.1725 = 1490

.9746
187 = 2718
7028 = 504

~~8021~~

33.9% Cu

Naumann

$NiCl_2$ - 74.0 - 93.7

59
70.8
129.8

74 = 4.8692
18 = 2553
5.1245
59 = 1.7709
3.3556 = 2260

5.1245
13 = .1139
.0106 = 1.030

93.7 = 9717
2553
2270
7709
4561 = 2860

~~59~~
7709
1139
6570 = 45

2270
1139
1131 = 1300

45.4% Ni

79.9
159.8

$NiBa_2$ 718 cu Kα

59
159.8
218.8

718 = 8561
18 = 2553
59 = 6008
8299 = 6960

219 · 3404
2609 = 1830

7709
3404
4305 =
26.9% Ni

718 = 8561
18 = 2553
59 = 1114
7709
3405 = 2190

1114
219 3404
7710 = 590

Th

NiI_2 – 41.4 cu (Pret)

126.8
59
253.6
59
312.6

414 = 6170
18 = 2553
59 = 8723
7709
1014 = 1260

8723
4942
3781 = 239

7709
4942
2767 = 189

Th

$Na_2O \cdot H_2O$ – 0.08.00

59
39
98

608 = 7839
18 = 2553
59 = 0392
7709
2683 = 1850

.039 =
73 · 9685
.0707 = 1180

7709
9685
8024 = 633

Th

$Na_2S \cdot 5mH_2O$ – 2.9300 (Dow)

59
32.1
91.1

193 = 2856
18 = 2553
59 = 5409
7709
7700 = 589

34

5409
911 = 9595
5814 = 2.8

7709
9595
8111½ = 6.4
1.8

Th

$NiSO_4$ 229 in net —

59
32.1
64
155.1

229 = 3598
18 = 2553
5.6151
59 = 1.7709
5.8442 = 6985.

195 = 1903
6151
12482 = 2660
7709
1903
5806 = 38.1%

$NiNO_3$ 113 in net

59
28
86
183

112 = 30531
18 = 2553
53088
1.7709
5.5395 = 3450

183 = 3084
2025
10459 = 1110

7709
2025
5084 = 32.2%

$Ni.O.SO_3 Aq.$ 88.150

88.1 = 1.9459
18 = 2553
2.2003
59 = 1.7709
3.9494 = 2690

3003
1903
0100 = 1020
38.1%

Neumann —

$ZnCl_2$ 97.2% - 112.8

65
70.8
135.8

972 = 1.9877
2553
5450
65 = 1.8129
8129
1335
6794 = 47.8%

113 = 0531
2553
3084
8129
7855 = 3120

2450
136 = 1335
1095 = 1290

3084
1335
1749 = 1490

79.9
157.8
759.00

90.900

Zn Br₂ — ~~[illegible]~~

65
157.8
1248

~~[illegible]~~

759 = .8802
.18 = 2553
51355
66 = .8129
3226 = 2100

90.9 = 9556
2553
2139
8129
801.0 = 2520

8129
3522
4607 = 28.9%

225 = 1355
3522
7833 = 607

2139
3522
8617 = 727

Zn I₂ — 49.2 — 60.5

126.8
5536
65
318.6

49.2 = .6920
.18 = 2553
.9473
.05 = .8129
.1344 = 1360

60.5 = .7818
2553
.0378
8129
8242 = 1600

8129
5038
3091 = 19%

.19 = 9473
5038
.4435 = 278

.0377
5038
5333 = 341

ZnO·H₂O — 82.6 day

65
32
97

82.6 = .9170
4424
3594 = 2290

.9170
2553
.51723
.04 = .9956
.1767 = 1500

8129
2295
8164 = 65.5%

Zn

ZnS in H₂O — 41.5 day

65
32.1
97.1

41.5 = .6180
4424
.0604 = 1130

.6180
2553
.8733
97.1 = .28872
.8861 = 2600

8129
2872
8257 = 66.9% Zn

Zn

1.8 = .2553
8129
14424

7-18-99 –

To decompose ZnO, H_2O_1

$ZnO, H_2O_1 = 82.6$ oo

1 Amp hr = 1.21 gr Zn –

1.21) 65.00 (53.8 Amp hr = 65 gr Zn –

60.50
4.50
3.63
.930

82.6
3.97

5782
7434
2478
327.9 = B.T.U. –

BTU.
1 ~~Amp~~ 293 Watt hr

328 X 293 =
53.8

25159
9.4668
1.98222
1.7308
1.2514 = 1.78 Volt

8.54

2514
9375
1829
9370
2659 =

$ZnO = 85.4$

$\frac{1.78 \times 85.4}{82.6} = 1.84$ Volts –

$ZnSO_4$ - 230 — 248.4

65
32.1
64
161.1 | 65000 | 40.3
6448
5600
4032
7670

230 = 3617 - 53617
4424
16 = 2553
6320 - 56170
161 = 2068
9102 = 2570

248.4 = 3945
65 = 8129
4424
2068
9527 - 8900
6061 = 40.4%

3945
2553
6498
2068
4450 = 2774

$ZnNO_4$ - wet 132.3

65
28
90
189 8129
2765
5564 = 344%

132 = 1213
4424
5637 = 3660

1213
16 = 2553
3766
189 = 2765
1001 = 1260

ZnO Dry — 85.4

65
16
81.1

85.4 = 9315
4424

9315
2553
1868
81 = 9085

8129
9085
9044 = 80.2%

3739 = 2370

2783 = 1900

$Zn_2O_1SO_4$ ag. 161.1

161.1 146 = .0257
4424
.4681 = 2944

.0257
16 = 2553
.1810
161 = 2068
.0742 = 1190

5637
4044
9736 = 941

2 5166 = 324
2

1 = 557%

132.3 : 28 = 4.7260
28 : 4.7260
26 46
1 6448
161 5
1 2350
132300
3661

18 = 2553
39.1 = 5722
7631

18 = 2553
23 = 3617
8736

H_2O = 68.3 water — 58.0 vapor

68.3 = 8344 — 58.0 = 7634
18 = 2553 — 2553
.0897 — .0187
2553 — 3010
.0457 = 11.1% — .7887 = 6150 — 18 = 2553
7634 = 58,000

.0897 — .0187
2553 — 3010
8344 = 68.3 — 7177 = 52.50

KOH = 104 — 116.4

39.1
16
56.1

104 = .0170 — 116 = .0660
6631 — 6631
6801 = 47.94 — 7291 = 53.64

5722 — 18 = .0170 — .0660
7490 — 2553 — 2553
8432 = 59.4 — 5722 — 3275
7490
5233 = 33.90 — 5722 = 37.35

NaOH = 102.0 — 111.8

23.0
16
40

102 = .0086 — 112 = .0492
8936 — 8936
9022 = 79.80 — 9428 = 87.70

23 = 3617 — .0086
40 = 6021 — 2553
7596 = 5 — 2639 = 7.0
40 = 6021
6618 = 45.80

.0492
2553
.0945
6021
7024 = 50.40

KSH aq — 65.1

39.1
32.1
72.2

65.1 = .0136 — .0136
6631 — 2553
4767 = 33.00 — .0689
5722
8585
7337 = 54.27 — 722 = .8585
7104 = 49.46

Naumann

NaOH aq — 60.450

23
35.1
56.1

60.4 = 7814
11
8936.521
6750 - 4730 2877 = 1940

3617
7066
8127 = 41% Na

Wiermann —

HCl — 105.6 — 101.2

35.4
39.4
74.5

105.6 = 10232
11
6631
6863 = 4860

3922
3723
7200 = 52.5%

18 = 2353
2795
2353
2550

101.2 = 10095
6631
6720 - 4470
10095
2553
2648
2722
2726 - 4470

Th —

NaCl — 97.6 — 96.5

23.0
35.4
58.4

97.6 = 9894
11
8936
8830 = 7640

3617
7066
8955 = 39.4

15 = 9894
2553
2447
58.4 = 7664
4783 = 3070

96.5 = 9845
8936
8781 = 7550

9845
2553
2398
7664
4734 = 2970

Th —

NaSO4 — 344.5 — 337.2

78.2
32.1
16
174.3

344 = 537.2
18 = 2553
7925
78.2 = 8532
8793 = 7930

337 = 5279
2553
7632
8532
8000 = 7700

8932
2413
6519 = 44.9

174 = 7925
2413
5512 = 3560

7632
2413
5419 = 38.5

Na_2SO_4 328.5 — 329.0

96
32.1
64
142.1

328 = 5165 — 329 = 5172
18 = 2553 — 2553
7718 — 7725
.6 = .0025 — .0025
6628
1526
5102 = 32.9 % — 1090 = 12.900 — 1097 = 12.900
142 = 7718 — 7725
1526 — 1526
6192 = 4160 — 6197 = 4170

K_2O, SO_3 a.g. — 195.8

78.2
32.1
64
174.3

195 = 12.919 — ~~12.918~~
18 = 2553 — 5472
5472
39.1 = 15922 — 174 = 2405
19550 2 = 9020 — 3.067 = 2030
9510

7-19-99 -

Electrolysis -

~~At~~

20% KOH. Sol. containing Zn + impurities - gradual increase voltage. Plat. electr. small amount of gas from - elec. at 1.2 Volt - about the same up to 1.5 Volt - A slight Cu deposit visible after several hrs. The sol. was film small Edison Cell partially disc. pure KOH - at about 1.6 Volt begin to gas at + elec -

Get Zn at about 1.9 Volt - Slight deposit, apparently Cu at 1.6 Volt -

Electrolysis

25% KOH sol. Zn C_2H_2 added
and Cu dissolved from sheet Cu
anode —
Cu begins to deposit at 1.2 volt
voltage gradually raised to 1.6 volt
deposit bright at first
then black
Sure point at 1.6 volts —

Cu all comes out in
time, not Zn visible
at 2 volts — but may
have come on black deposit

Theoretical Battery — 2-22-99

20 plates for Zn $10\frac{1}{2} \times 42''$

Total area $21 \times 42 \times 20 = \underline{17,640}$

Weight of Zn per .001" deposit

$17.64 \div 4 = \underline{4.41}$ lb

1.9 lb Zn per Ft. hr (pg. 4)

.001" deposit $= \frac{4.41}{1.9} = \underline{2.32}$ Ft. hr

$1.9 \overline{)4.41} \; (2.32$
38
61
57
40

121
2
242
232
260

1 Ft. hr $= \frac{.001}{2.32} = .00043$" deposit

1 Amp. hr. per sq in $= .00432 \times 2.2 = \underline{.00266}$ lb

1 Amp hr per sq in for cell $= .00266 \times 17640 = \underline{46.9}$ lb

17640
2.66
105840
105840
35280
46924

1 Amp hr per 3 sq in $= \frac{46.9}{3} = 15.6$ lb Zn per cell

$\frac{15.6}{1.9} = \underline{8.21}$ Ft. hr

$1.9 \overline{)15.6} \; (8.21$
15
40
36
4

1 Amp hr per 3 sq in $= \frac{8.21}{2.32} = \underline{3.54}$

$2.32 \overline{)8.21} \; (3.54$
696
1250
1160
900

Ni grids .003" thick

Weight 8820 x .003 x .317 = 8.35 lb Ni

.886 = 3.9955
.517 = 5.4771
.9237 = 8.35

Ni Zn plated with min .001" all over

Weight of Fe 8820 x .002 x .26 = 4.59 lb Fe

.52 = 3.9955
.7900
.6615 = 4.56

Assume 1 cu. ft on 3" the limit —
15.6 lb. Zn : (pp. 16)

(4) 15.6 x 1.22 = 19.0 lb CaO required
312
156
156
19.032

Step — CaO = 6.3
19.0
6.3 x .036 = 83.8 cu in. solid CaO

.63 = .7993
.36 = .3563
.3556

19 = 1.2788
.3556
1.927 = 83.8
41.9
125.7

With 33% voids 125.7 cu in per 21

~~19~~ grids = 125.7 / 19 x 10.5 x 10.5 = 21 114 / 54 (6 / 90)

19 = 1.2788
110 = 2.0414
3.3202

126 = 2.1004
3.3202
8.7802

.055 = ~~.060~~ thick over

Allowing for ▭▭▭ make space in grids .07"

Ni grid. for CuO

$\frac{8.35}{20} \times \frac{19}{2} = 3.97$ lb Ni in grids

$\begin{array}{r} 835 \\ 19 \\ \hline 7515 \\ 835 \\ \hline 15865 \end{array}$ $\begin{array}{r} 4)15865 \\ 3.97 \end{array}$

20 plates m = 1/4" thick = 5"

$20 \times .42$" ▭ .08" " 1.68"

~~38~~ spaces $\frac{3}{8}$" " 15.8

22.5

1/4" inch on end 23" inside

11 X 11 X 23 — Tap

vol. of all $11 \times 11 \times 23 = 2783$ cu in

$\begin{array}{r} 121 \\ \times 23 \\ \hline 363 \\ 242 \\ \hline 2783 \end{array}$ $\begin{array}{r} 2783 \\ 141 \\ \hline 2642 \end{array}$

Ni lb = $\frac{3.9748.35}{217}$ = 39 cu in

$\begin{array}{r} 217 \overline{)8.62} \; (39 \\ 651 \\ \hline 2510 \end{array}$

Vol iron = 18 cu in

" CuO = 84 " "

141 " "

" vol 2783 − 141 = 2642 cu in

Sp. gr. vol — 25% = 1.28

Weight .0361 X 2642 = 95.4 lb

$\begin{array}{r} .0361 \\ 2642 \\ \hline 15852 \\ 7226 \\ \hline 95.3762 \end{array}$

4) 954 lb
238.5 lb NaOH

954
125
7632
1908
954
122112

4) 122 lb
30.5 lb NaOH
2

15.25 lb
7.62 lb

Total weight of cell
8.35
4.59
19.00
3.97
16.00
122.00
173.91 lb

173.9 lb
Weight per lb
7.6) 173.9 (23 lb
152
219

7-25-99

Iron Deposits see pp. 34

Iron sulphate, $FeSO_4$ with about ½ the amount NH_4Cl does well, iron sat.

Addition of a little HCl and iron anode seems to improve it.

NH_4Cl with iron anode gives best deposit but sol. oxidizes rapidly.

$FeSO_4$ & NH_4SO_4 fair.

NH_4Cl N. G.

$FeSO_4$ precip. by NH_4Cl, and redissolved in HCl. fair.

$FeSO_4$ & Ammo. Oxalate fair.

7-26-99 21

Na_2O, SO_3 - aq. - 186.640

142.1

187 = 5.2769
18 = 1.2553
5.5266 =
46 1.6628
3.8638 = 7300

142 5262
1526
3736 = 2360

Naumann —

K_2O, aq 164560 — 94.3 5.4713
1.9745
3.4968 = 3140

78.3
16
94.3

102 = 5.2160
18 = 1.2553
5.4713

78.3
1.8938
3.5775 = 3780

1.8938
1.9745
3.9193 = 8370

Naumann —

Na_2O aq - 155260

62
16
62

155 = 5.1911
18 = 1.2553
5.4464
46 = 1.6628
3.7836 = 6080

4464
2924
6340 = 2540

6628
9324
8708 = 7428

Naumann

HCl = 22000 — 393.00

35.4
16
36.4

22000 = 4.3424
18 = 1.2553
4.5977 = 39600
26.4 5.6111

393 = 4.5911
1.2553
4.8497 = 70700
5.6111
4.0366 = 1920

3.2886 = 1940

Ostwald

H_2SO_4 = 19.3100 - 21.09 ~~00~~

32.1
64.
98.1

193 = 5.2858
18 = .2553
2 = 5.5411
.3010
5.2401 = 174400

211 = 5.3241
.2553
5.3794
.3010
5.2784 = 190100

3010
9917
3093 = 2.04%

5.5411
961 = 1.9917
3.5494 = 3540

5.5411
.9917
3.5877 = 3870

3065
9917
5748 = 32.1%

5.5411
32.1 = 1.5065
4.0346 = 10800

5.5794
1.5065
4.0729 = 11500

SO_3 = 1033 00 - 1425 00

80
32.1
80.1

103 = 5.0140
18 = .9553
5.2693
for H SO4 1.9836
3.3857 = 2320

142 = 1.1538
.2553
1.4091
.9836
.4255 = 3800

for H2SO4 Pct = 5.2693
1.9917
3.2776 1890

.4091
.9917
4178 = 2610

HNO_3 = 4190 - 4910

14
48
63

419 = 4.6222
18 = .2553
4.3775 = 75400
47 = 1.7993 1200
3.0782 = 75400

491 = 6911
.2553
.9464 = 88400
7993
.1471 = 1400

47993
2007 = 1.5971 %

14 = 1461
7993
3468 = 22.2 %

N_2O_5 = 13100 – 29800

55
55
108

131 = 4.1173 — 298 = 4742
18 = 2553
4.3726
per lb N_2O_5 108 = 2.0334
2.3392 = 218 — 7295
0334
6961 = 997

108
108
108

4.3726
per lb HNO_3 = 2.1004
2.2722 = 187 — 7295
1004
6291 = 426

NH_3 = 12000 20400

124 = 4.0792
18 = 2553
4.3345
per lb N = 4.2.1441
3.1884 = 1540
per lb NH_4OH = 4.3345 — 204 = 3696
2553
1543
1441
4.3649 = 2020
4.3649
1.5441
3.10208 = 1050

H_3PO_4 = 302900 – 305600

3
3
64
98

503 = 5.4813
18 = 2553
5.7366
3 = 4771
5.2595 = 152000 — 306 = 48.51
2553
7904
4771
2133 = 183000

5.7366
98 = 1.9772
3.7594 = 5.6014 — 7404
9912
7492 = 5610

9771
9916
1859 = 3.06 %

51 = 4914
9912
5002 = 21.6 %

P_2O_5 aq. 2×2030.00

$406.000 / 18 = 5.6055$

2.5553

3.8638

per lb H_3PO_4 196 $= 2.2923$

$3.5715 = 3730$

$KClO_3 = 959.00$

39.1
35.4
48.
122.5

per lb $K = \frac{959.00 \times 1.8}{39.1} = 4410$

per lb $KClO_3 = \frac{959.00 \times 1.8}{122.5} = 1410$

$\frac{39.1}{122.5} = 31.8\%$ K $\quad \frac{35.4}{122.5} = 28.9\%$ Cl

---

KCl $104.300 - 99.900$

per lb K $= \frac{104.300 \times 1.8}{39.1} = 4800 \quad 4800$

39.1
35.4
74.5

$\frac{99.900 \times 1.8}{39.1} = 4620$

per lb KCl $= \frac{104.300 \times 1.8}{74.5} = 2530$

$\frac{99.900 \times 1.8}{74.5} = 2420$

$\frac{39.1}{74.5} = 52.5\%$ K

$Na_2O = 80.400 - 135.400$

per lb Na $\frac{80.400 \times 1.8}{46} = 3150$

46
35.5
80

$\frac{135.400 \times 1.8}{46} = 5300$

per lb NaOH $= \frac{80.400 \times 1.8}{80} = 1800$

$\frac{135.400 \times 1.8}{80} = 3050$

NH_4Cl 75600 – 71800

per lb NH_3 = $\frac{75600 \times 1.8}{18}$ = 7560

$\frac{71800 \times 1.8}{18}$ = 7180

per lb NH_4Cl = $\frac{75600 \times 1.8}{35.4}$ = 3850

$\frac{71800 \times 1.8}{35.4}$ = 3650

$\frac{18}{35.4}$ = 51% NH_3

$NH_4{}_2SO_4$ = ~~282200~~ 279600

per lb NH_3 = $\frac{282200 \times 1.8}{36}$ = 14110

$\frac{36}{35.4}$
$\frac{720}{1324}$

$\frac{279600 \times 1.8}{36}$ = 13980

per lb $NH_4{}_2SO_4$ = $\frac{282200 \times 1.8}{132}$ = 3860

$\frac{36}{132}$ = 27.4% NH_3

$\frac{279600 \times 1.8}{132}$ = 3810

NH_4NO_3 = 88000 – 81800

per lb NH_3 = $\frac{88000 \times 1.8}{18}$ = 8800

8180

per lb NH_4NO_3 = $\frac{88000 \times 1.8}{80}$ = 1980

$\frac{81800 \times 1.8}{80}$ = 1840

354
31
354
1324

$Ca(OH)_2$ = 214900 – 217900

per lb Ca = $\frac{214900 \times 1.8}{40}$ = 96800

$\frac{217900 \times 1.8}{40}$ = 98500

per lb $Ca(OH)_2$ = $\frac{214900 \times 1.8}{74}$ = 52200

$\frac{40}{74}$ = 54.1% Ca $\frac{217900 \times 1.8}{74}$ = 53000

CaO = 121000 hydrated ~~150~~ 146500

per lb Ca $\frac{131000 \times 1.8}{40}$ = 59000

$\frac{146500 \times 1.8}{40}$ = 66100

per lb $Ca(OH)_2$ $\frac{131000 \times 1.8}{74}$ = 31900

$\frac{146500 \times 1.8}{74}$ = 35700

$CaCl_2$ = 169800 – 187200

per lb Ca = $\frac{169800 \times 1.8}{40}$ = 76600

$\frac{40.8}{110.8}$ $\frac{187200 \times 1.8}{40}$ = ~~87~~ 84200

$CaCl_2$ $\frac{169800 \times 1.8}{110.8}$ = 27800

$\frac{187200 \times 1.8}{110.8}$ = 30500

$\frac{40}{110.8}$ = 36.2% Ca

169800
187200
1.8
1356400
169800
304440
306000
187200
337000

$CaSO_4 = 318400 - 323100$

for lb Ca $= \frac{318400 \times 1.8}{40} = 14360$

$\frac{323100 \times 1.8}{40} = 14500$

52.1
40.
64
136.1

$\frac{318400 \times 1.8}{136.1} = 4140$

$\frac{40}{136} = 29.4\%$ Ca $\frac{323100 \times 1.8}{136.1} = 4260$

$Ca(NO_3)_2 = 202600 - 206600$

for lb Ca $= \frac{202600 \times 1.8}{40} = 9110$

$\frac{206600 \times 1.8}{40} = 9310$

16
32
48
164

$Ca(NO_3)_2 = \frac{202600 \times 1.8}{164} = 2220$

$\frac{206600 \times 1.8}{164} = 2270$

$\frac{40}{164} = 24.4\%$ Ca

$CaCO_3 = 270400$

12
40
48
100

$\frac{270400 \times 1.8}{40} = 12180$

$\frac{270400 \times 1.8}{100} = 4867$

40% Ca

$Fe(OH)_2$ = 136700

34
237
271

$\frac{136700 \times 1.8}{237}$ = 1060

$\frac{136700 \times 1.8}{271}$ = 910

$\frac{237}{271}$ = 87.5% Fe

$Fe(OH)_3$ = $\frac{1982000 \times 1.8}{237}$ = 1504

51
237
288

$\frac{1982000 \times 1.8}{288}$ = 1238

$\frac{237}{288}$ = 82.6%

Fe_3O_4 $\frac{2697000 \times 1.8}{711}$ = 670

33
711
744
775

$\frac{2697000 \times 1.8}{775}$ = 614

$\frac{711}{775}$ = 92%

$FeCl_2$ = 82100 = 100000

237
76.8
307.8

$\frac{82100 \times 1.8}{237}$ = 624

$\frac{100000 \times 1.8}{237}$ = 759

$\frac{82100 \times 1.8}{307.8}$ = 482

$\frac{100000 \times 1.8}{307.8}$ = 585

$\frac{237}{307.8}$ = 77.2%

$FeCl_3$ = 96100 — 159400

$\frac{96100 \times 1.8}{237} = 730$

$\frac{96100 \times 1.8}{341.2} = 509$

$\frac{159400 \times 1.8}{237} = 121$

$\frac{159400 \times 1.8}{341.2} = 840$

$\frac{237}{341} = 69.3\%$

$FeSO_4\,aq$ = $\frac{235600 \times 1.8}{237} = 1780$

$\frac{235600 \times 1.8}{333} = 1270$

$\frac{237}{333} = 72.6\%$

$Fe_2(SO_4)_3\,aq$ $\frac{618400 \times 1.8}{237 \times 2} = 2350$

$\frac{618400 \times 1.8}{762} = 1460$

$\frac{474}{702} = 67.1\%$

$Zn(OH)_2$ = $\frac{151100 \times 1.8}{65} = 4190$

$\frac{151100 \times 1.8}{99} = 2750$

$\frac{34}{99} = 34.4\%$

Hg_2O = $\frac{222\,00 \times 1.8}{200}$ = 199.8

$\frac{400}{414}$ = 96.2% $\frac{22200 \times 1.8}{216}$ = 96.2

~~92.6% Hg~~

HgO = $\frac{20700 \times 1.8}{200}$ = 188

$\frac{200}{216}$ = 92.6% $\frac{20700 \times 1.8}{216}$ = 172

$HgCl_2$ $\frac{62600 \times 1.8}{400}$ = 281

$\frac{400}{471}$ = 85% $\frac{62600 \times 1.8}{470.8}$ = 239

$HgCl$ 53200 - 49900

$\frac{53200 \times 1.8}{200}$ = 479

$\frac{53200 \times 1.8}{271}$ = 354

$\frac{200}{271}$ = 73.8% $\frac{49900 \times 1.8}{200}$ = 450

$\frac{49900 \times 1.8}{271}$ = 332

471
85
2355
3768
40075

Ag_2O $\quad \frac{5900 \times 1.8}{216} = 49$

$\frac{216}{232} = 91.5\%$ $\quad \frac{5900 \times 1.8}{236} = 45$

$AgCl$ $\quad \frac{2940 \times 1.8}{108} = 48.8$

$\frac{108}{143}$ $\quad \frac{2940 \times 1.8}{143} = 37.0$

$\frac{108}{143} = 75.6\%$

Ag_2SO_4 $\quad 1673.0 - 1628.0$

$\frac{216}{312}$ $\quad \frac{1673 \times 1.8}{216} = 13.95$

$\frac{1673 \times 1.8}{312} = 9.62$

$\frac{216}{312} = 69\%$ $\quad \frac{1628 \times 1.8}{312 - 216} = 13.58$

$\frac{1628 \times 1.8}{312} = 9.40$

Ag_2CO_3 $\quad \frac{1229.0 \times 1.8}{216} = 10.20$ $\quad \frac{216}{276}$

$\frac{216}{276} = 78.2\%$ $\quad \frac{1229 \times 1.8}{276} = 8.00$

$AgNO_3$ $\quad = 2570.0 - 2330.0$ $\quad \frac{108}{170}$

$\frac{257 \times 1.8}{108} = 4.28$

$\frac{257 \times 1.8}{170} = 3.04$

$\frac{108}{170} = 63.7\%$ $\quad \frac{233 \times 1.8}{108} = 3.89$

$\frac{233 \times 1.8}{170} = 2.47$

$\frac{3.89}{2.47}$
$\frac{2.58}{1.89}$
$\frac{1.56}{1.50}$

$\frac{63.7}{77}$
$\frac{11459}{6379}$
$\frac{10829}{}$

$Ag_2O, N_2O_5 aq$ — $\frac{168000 \times 1.8}{216} = 140$

$Ag_2O, SO_3 aq$ — $\frac{20400 \times 1.8}{216} = 169$

PbO $\frac{503.00 \times 1.8}{207} = 437$

$\frac{207}{223} = 93\%$ $\frac{503000 \times 1.8}{223} = 406$

$PbCl_2$ $828.00 - 76000$ $\frac{207}{278}$

$\frac{828000 \times 1.8}{207} = 719$

$\frac{828000 \times 1.8}{278} = 536$

$\frac{207}{278} = 74.5\%$ $\frac{76000 \times 1.8}{207} = 660$

$\frac{76000 \times 1.8}{278} = 490$

$PbSO_4$ — $\frac{2162.00 \times 1.8}{207} = 1880$ $\frac{207}{32}$ $\frac{16}{303}$

$\frac{207}{303} = 68.2\%$ $\frac{2162 \times 1.8}{303} = 1280$

$PbCrO_4 =$ $105500 - 97900$ $\frac{Cr}{207}$ $\frac{52}{331}$

$\frac{105500 \times 1.8}{207} = 917$

$\frac{105500 \times 1.8}{331} = 572$

$\frac{207}{331} = 62.6\%$ $\frac{97900 \times 1.8}{207} = 852$

$\frac{97900 \times 1.8}{331} = 532$

243
93
668
1997
2068

632
307
2016
2016
2016
2016

1055
76
979

$PbCO_3$ = $\frac{72900 \times 1.8}{207}$ = 632 $\quad \frac{207}{267}$

$\frac{207}{267}$ = 77.5% $\quad \frac{729 \times 1.8}{267}$ = 490

$Pb_2O_5SO_3$ aq = $\frac{73800 \times 1.8}{207}$ = 640

$\frac{73500 \times 1.8}{303}$ = 435

$Pb_2O_5N_2O_5$ aq $\quad \frac{68100 \times 1.8}{207}$ = 591

$\frac{68100 \times 1.8}{331}$ = 370

$Sn(OH)_2$ = $\frac{1365 \times 1.8}{118}$ = 2080 $\quad \frac{118}{152}$

$\frac{118}{152}$ = 77.7% $\quad \frac{1365 \times 1.8}{152}$ = 1620

$SnCl_2$ = 80800 = 81100 $\quad \frac{118}{189}$

$\frac{80800 \times 1.8}{118}$ = 1380

$\frac{118}{189}$ = $\quad \frac{80800 \times 1.8}{189}$ = 769

$\frac{811 \times 1.8}{118}$ = 1240

$\frac{814 \times 1.8}{189}$ = 772

$Sn(Cl_4$ 127200 157200 354 / 197.6 / 157

$\frac{127200 \times 1.8}{118} = 1940$

$\frac{127200 \times 1.8}{260} = 880$

$\frac{118}{260} = 45.4\%$ $\frac{1572 \times 1.8}{118} = 2400$

$\frac{1572 \times 1.8}{260} = 10.82$

$Au(OH)_3 = \frac{96000 \times 1.8}{197} = 87\%$ 197 / 248

$\frac{197}{248} = 79.1\%$ $\frac{96000 \times 1.8}{248} = 693$

Au_2O_3 aq $\frac{-13200 \times 1.8}{197\ 393} = -60.8$

$\frac{393}{441} = 89\%$ $\frac{-13200 \times 1.8}{441} = -53.8$

$AuCl_3$ 22800 – 27300 -35.8 / 100.4

$\frac{197}{303}$ $\frac{22800 \times 1.8}{197} = 208$

$\frac{22800 \times 1.8}{303} = 135$

$\frac{27300 \times 1.8}{197} = 250$

$\frac{197}{303} = 65\%$ $\frac{27300 \times 1.8}{303} = 162$

AuO $\frac{5800 \times 1.8}{197} = 54$ 197 / 35 / 232

$\frac{5800 \times 1.8}{232} = 46$

$\frac{197}{232} = 84.8\%$

7-28-99

To heat $Cu(NO_3)_2$

$Cu(NO_3)_2 - (H_2S) + H_2O = 2HNO_3 + Cu + O$

92300
68300 = 49100
142600
~~142400~~

~~2 HNO3~~
~~42300~~

~~2 HNO3 + Cu~~

Cu_2O, N_2O_5aq = 52410

$\frac{52300}{46400}$ = 1.13 Volt

$CuSO_4 + H_2O = H_2SO_4 + Cu + O$

~~17800~~ + 68300 = 210900 + 55800

198400
266700
217900
55800

$\frac{558}{464}$ = 1.22 Volt

$CuCl_2 = Cu + 2Cl$

62200

7-28-99

Iron deposit — in NH_4 —
Sulphate — worked
continually about 5 hrs —
Deposit for about 1-45 hr.

$FeSO_4$ NH_4Cl —
Dark deposit — rubs bright —
apparently very thin —

$FeSO_4$ Ammo Oxalate —
Bright, light-colored deposit —
better than above —

$FeSO_4$ NH_4SO_4
Appears like the oxalate
but not so thick —

NH_4Cl dark deposit —
rubs bright apparently
thin, perhaps best of
the lot.

prevent + dissolve Cl —
perhaps best all are
thin —

To reduce 25% NaOH Sol to 20% —

Sp gr of 25% with Tm 1.40

Wt of 100 cc 25% = 128 gr —

" " NaOH in 100 cc = 32 gr —

" " H_2O in 25% = 96 gr —

" " H_2O in 20% = 128 gr —

Add 32 cc of 32 cc H_2O to

100 cc Sol —

$132 \overline{)3200}\ (24.2$ — 200 / 48.4 / 151.6

254 / 560 / 528 / 320 / 48.4

Sp gr sol with Tm 1.32

To make 175 C.C. —

242 / 175 / 1210 / 1694 / 242 / 42350 — 42.3 H_2O / 132.7 Sol —

Determination of Zn in reg. sol.

20 c.c. strong sol.
15.5 c.c. H_2O.
Slight precip. not enough to warrant filtering 12.9935
Weight of Zn, elect. 10.8425
2.093
Current .19 amp. 12 V.
Add 7 gr. NaOH at 1-45
Separation not complete
20 c.c. of 25% sol. = $\frac{1.25 \times 25}{4}$ = 6.1 gr. NaOH

~~5 c.c. strong sol.~~
~~add H_2SO_4 to reduction~~
~~Weight elect. 17.9222~~
~~Zn found 10.341~~

8-3-99

KOH sol in R cell 700 gr.
20% by weight Sp. gr. 1140 = 16%

3-30 P.M.	3.8 amp
3-40	4.4
3-20	5.4
5-0	5.7
8	5.7
8 A.M. 8-4-99	4.5
10	3.0
11-30	

8-5-99

Notice local action, make connection 2 P.M. - 6.5 Amp died in a few minutes

Transfer to new cell 700 gr current start at 1 amp. 2-10 P.M. evidently coating of Zn in C.O.

2-15	2.7 Amp
3-15	5. Amp
8-30 A.M. 8-6-99	4.3 "
4-0 P.M.	3.85
5-0	5.8

8-2-99

Nickel in grade contains a large amount of iron —

Boiler stuffed with Cu_2O — reduced the 20% NaOH, and on oxidizing give off large amount of H. apparently from the scale, since Fe & Cu — keep working them to get all out, on second oxidization do not get as much as in first.

Nickle used in 20% NaOH give off Fe when oxidized reducing not, funk —

8-4-09

Weight of Standard grid 4.87 5.97 gr
" of Scale 8.9 gr

Size of grid, 2 1/4 x 7/4 x 1/2

Second 25% NaOH Sol
with Ice –
Sp. gr. approx 1.44 sp. gr –
much heavier than 1st –

To reduce to sp. gr. 1.32

100 cc sol
145 / 45 cc (25%
425
150

45 cc H_2O
175 " 175
31 " 54 cc H_2O
175
525
54.25 120 cc sp.

Cement —

Oxychloride Magnesia —

Chloride sol — 1.26 sp gr —
28%

1st part — Thick paste
2nd " Thin " 5 gr. 23 cc —
3 " Fluid —

4
5 } Dilute sol — with 25% ate
6 } sol. of water —

7
8 } Dilute original sol with 50%
9 } sol water if first addition is ok —

8 - 29 - 99 11-75

#1 A —
5 gr. MgO 11 cc $MgCl_2$ sol —
1.26 sp gr — = 28% $MgCl_2$
67 Hr set —
Mottled appearance quite
hard to heal very smooth
even under microscope part
milk white & part translucent

#1 B — Same 16 cc Sol —
Uniform in appearance. like
pottery, about same hardness
as #1. fracture like china —
67 hr —

#3 — 23 cc sol —
shows free water on surface
may be a little softer than
#1 but equally good
appearance — Softer to
touch — 68 hr —

#3 30 cc sol —
Here H2O, good appearance
a little softer —
68 hr —

#4 15 cc [original sol
diluted with 25% H2O] —
Soft good appearance
68 hr —

#4a 15 cc as above,
42 hr off ground in water
harder than #4 nearly as
hard as #1 — Mottled appearance
and one or two bubbles —

#5 — Mottled, quite hard
but not like 4b —
42 hr —

#6 rather soft — not so
smooth as some —
much very light & smooth
42 hr

#7 cracked in drying
rather soft — 1 bubble —
42 hr —

#8 cracked drying, absorbs
very soft & poor surface —

#9 soft, surface not
bright & glaze — but good

#2 & 3 thrown out under
#1-4a - 6 - & 9 were best
2 & 3 were good except
for bubbles —

Sp. Gr. of 20% weight Soda
1,200 = 18.58% NaOH

Sp. Gr. 30% Potash
1,212 = 23% KOH

~~Potash~~ cell 645 gr Zn
Cell exhausted 388 " "
~~5 [illegible]~~ weight KOH.
1030 1,214 of gr = 23%
2400 " H_2O
645 Sp gr with Zn 1,310
~~388~~
257 gr of Zn ⁄

All these suffer in water, the hardest can be marked with finger nail

Water in KOH solution —

2400 gr water
1030 " solution
3430

3430
23
1029
686
7889 gr KOH

1034 / 7889 (76.6% KOH —
7240
690
618
620

To make 1800 cc 35% sol —
of gr = 1,349

1,35
1800
1080
135
2430 gr.

2430
35
1215
729
850.5 gr KOH —

7.66 / 8505 (112 gr solution —
7605
905
765
1390

243
35
1595 gr water
27
(31 cc H_2O

Mt Zn 56 gr
248
31.2

55.9
5 gr distilled
this must

31 gr Zn & 112 gr solution — drop off
same relative amount as in 23% sol

Liquid Grid

commercial acetic washed, 3 Amp.

Bubbles on first situation 4.32 Amp. hr.

#1 overlayed 2.36 Amp. hr.

#2 " 3.18 " "

3 " 3.35 " "

3 " 2.36 2.369 1.81

1 2.36

2 " 2.71 2.774 1.81

Solid Grid

Weight 12.55

Mass of acetic 7.7 Amp. hr.

#1 overlayed 2.56 Amp. hr.

2 " 2.91 " "

" 3 " 4.22 " "

#1 1.92 Amp. hr. 3.44

2 " 3.40 " "

#3 4.05 " "

1 3.23 3.24

2 3.50 3.59

3 5.95 Amp. hr.

Effect. plates: 3.86

New grid 3.94

#1 #3

12.45 13.59

.45 .39

15.75

~~11.57~~ 10.65 14.7 1.02

.125

13.34 11.67 14.55

13.26 13.25 14.13

.50 .42

5 3/4

66

#1. NaOH and #2. KOH and #3 Sol NaOH

Start plate at 5 P.M. 9-22-29

.112 Amp — KOH gives most

gas at start —

Nickle plated grids, bottom

Current off 5 P.M. Na grids black

& gas leaves off on water line after

weight of deposit #1-.45 #2-.39

Local action strongest on #2 —

Current on 8-25 .112 Amp —

Quantity #1 & 3 in HCl —

Current off 10.25 .112 Amp

#1 & 3 N.G. #2 slight black

fringe on water line Ok —

Gain on #1 — .25

Current on 8-20 9-12-29 .112 Amp

Local action strong on #3

9-45 Column closed #1 in the

thoughts + 3 with H2 + new

new grids —

Cell off 12-10 .112 Amp —

Gain on #2 1.05 gr —

on 1-30

New grid #3 3-40 Gain .42

" " #1 4-0 " = .30

cell off 5:3

Cement for pearl —

1 cu. in. — = .0374 gr. H —
= .0374 × 8 = .2992 gr. O —
= .299 × 4 = 1.196 gr. Cu
= .299 × 5 = 1.495 gr. Cu O —

KOH well with Tannate Al.
on 11 amp 1-35 9-13-99
off 502 P.M. good defined strength
for hard black lamp, not
bitter stem first from plain KOH
gain
on 8-30 A.M. 9-14-99 2 amp
off 12 same as first
Unit 12.90 1-35 197

90 cc $NaOH$ 2 c/c H_2O not
35 " " "
55 H_2O

In 13.61 - 13.58 .27
On 2:35 9-13-99
Off 8-20 medium good 1 Hr
Gains .27
On 8-30 AM 9-14-99 18 Amp
off 12 fair
not 13.14 1-35 .197

90 cc KOH ZnO
90 cc NaOH ZnO
14.03 Zn — 14.66 — .63
3 — P.M. 9.13 — 9.9
off 8-15 .11 Amp — little better
Urban plain under — Gain .63
On 8-30 A.M. 9-14.29 .18 Amp
off 12 very fair
Int 13.45 1-35 .197

Continued from 48

#1 off 8-35 had —
#2 " 8-35 more surf
than at first good deposit.
#3 off 8-40 P.M.
#3 on 8-25 A.M. 9-14-99 [illegible]
#2 " 8-25 1200 of
#1 " "
#1 off 12 hoof
#2 " " "
#3 " " "
#1 & #3 thrown out
#2 at 13.17 on 1.35 1197

1225
1
2450
1225
2450

441
2
1323
882
441101 43
2536

Pure NaOH —

Amount of Na for 100 c.c. 2 gr.

NaOH sol — Sp. Gr. = 1.225

Total wt. = 100 × 1.225 = 2 = 0.5 gr.

220.5 × 2.0 = 441 gr. NaOH.

NaOH = 23 + 16 + 1 = 40 —

Of Na = $\frac{23}{40}$ × 441 = 25.36 gr. Na —

Cell #1 & 1a - 55 -

~~Cu O plates #1 = 12.5 gr #2 = 19.0~~

Cell #1 - 6% ~~Pot~~ KOH, purified by current, amalgam - Zn - No plates
Start at 10 AM - 9-21-99 - 4 - 20 amp
Zn begins to gas at 11 AM - continuous gas on plate - Zn covered with black deposit - H_2O_2 - clear - then off white
2:30 white ZO appears & all finished at bottom

Cell #1a - 180 cc KOH, sp. gr. 1.247
purified by current - plates from #1 to be placed in this - for local action

Cell #2 —

Mode of working — Keep lap — be barely
away on plate, charge + dis. on
40 H.rol — rod in 135 ft not by
2m with ordinary grids. —
Lap be on left away — .80 Amp h
charge and begins to come back (plate white)
but in grid that has been walled and
dis — 80 — dis — not show much Ay
reamaly — take out pail and charge
from water. 1.50 Amp h —
Begin dis 11:5 A.M. 9-21-98 .80 Amp h 1.50 Amp
" charge 3-30 P.M. .33 Amp — 1.30 Amp
" dis 9 " .60 "
" chg 11:30 .12 " 1.36
" dis 9-45 A.M. 9-22-99 — .35 Amp
" charge 1-35 P.M. 1.02 Amp h
" dis 8-35 — .34
eff see pp 62 —

Cell #3. –

237 KOH by current
Wd plated grid with Electro Cu
scale. Let ~~amps~~ Anal of Zn –
Let 1 amp be run, clean
& reanal. Zn – After
grid in reduced pure 14 amp
and let run at that –
12:15 P.M. – 9-21-99 3 amp hr –

1.96 / 8 = 8/1.96 = 4.245 gr H

8 HCl = H

.037 H | 2450 / 2204 / 2060 | 9.5

5/13.46 / 2.69

2.69 / 8 X 0.037 =

9031 / 5121 / 4760

4.96 / 4.760 / .1953 / 8 = .199

Lime superior scale

Weight of grind = 1 4.45 - 4.50

" " " Product 17.91 15.65

" " " scale 13.46 gh.95

Reduced 5.42 Amp. hr

Reduced after 14 - 2.50 = 11.50

13.46 - 11.50 = 1.96 gr O = 24.5 gr H = 6.5 Ampl

note partially exhausted and again reduced may have made the reduction more perfect

Theoretical O 2.69 gr —

" Amp hr 8.99

Weight Grind 4.6 gm 5.92 - 5.94

" " Product 16.99 16.50

" " scale 10.97 10.52

Reduced 4.72 Amp. hr [illegible]

Lube surf. scale ___

.7357 mg. scale —
dissolve in H_2S some little sand —
get .625 mg. Cu — electrical —
.584 mg.
Coat a little Cu and a little
may be objected. reason
Tolver Express Cu which
there is, not much good —

6.2005
5.7004
.5001
.110
6.25

Baking grade —

Silver cake wet — $Cu(NO_3)_2$ —
" " " dry. " " —
" " " " Cu acetate —
" " " wet grape sugar —

~~10-2-99 7:35 AM 10-2-99 8:00 AM~~
~~10-4-99 8:00 AM 10-13-99 10:00 AM~~
~~10-29-99 10:00 AM~~ 11-19-99 11 AM

~~10-2-99 9:10 AM 10-4-99 9:25 AM~~
~~10-5-99 10:00 AM 11-9-99 9:35 AM~~
~~10-11-99 8:15 AM 10-17-99 8:30 AM~~
~~10-17-99 8:15 AM~~ 11-19-99 8:40 AM

~~10-2-99 9 AM 7:40 AM 10-3-99 4:10 PM~~
~~10-4-99 1:30 PM 10-5-99 7:50 PM~~
~~10-6-99 8:0 AM 10-8-99 8 AM~~
~~10-12-99 8:15 AM~~ 10-17-99 8:15 AM
~~10-29-99 8:45 AM 10-4-99 8:45 AM~~
~~10-5-99 10:30 PM 10-8-99 10 AM~~
~~10-11-99 1:25 PM~~

~~10-3-99 8:30 AM 10-4-99 8:45 AM~~
~~10-5-99 8:15 AM 10-6-99 9:45 AM~~
~~10-9-99 11:15 AM 10-10-99 8:40 AM~~
~~10-11-99 8:10~~

9-27-99. 61

To be ox. on .25 Amp —
#1 grid with Superior resin:
washed in an acetate sol. + baked
O_2 = 2 amp hr — 1.2 — 1.3 — 4.5 — 4.9 — 4.5

#5 grid — Sup. resin. soak in $CuNO_3$ and bake. (about 1½ Amp. hr. short of #4 in reduction —) ox. 2.75 Amp hr — 2.4 — 3.4 — 3.7
4.0 — 3.8 — 4.2 — 3.8 — 3.6

#4 grid with Cu prep. by the form $CuSO_4$
O_2 = 2 amp hr — 1.4 hr — 1.0 — 1.7 — 2.1 — 2.2
2.1 — 2.4 — 2.5 — 1.9

#7 Ox grid — 5.77 ox plate — 14.53 plate ∴ has a large amt. metallic Cu. was prepared from freeze Cu + grape sugar — Theo. 10 amp hr.
4.0 amp hr — 3.5 — 4.5 — 4.2 — 4.0 — 4.1

#9 Ox grid 4.99 ox plate 13.25
Sulfur bake ox $CuNO_3$
3.5 amp hr — 3.0 — 1.7 — 3.2 — 2.1 — 2.8 — 2.5
3 — 2

~~10-3-99 9:45 8:35 AM~~ 14:34 1.59 (1.75)
~~10-4-99 8:30 PM~~
~~10-6-99 10:30 AM~~
~~10-9-99 7:40 PM~~

~~10-2-99 9:15 PM~~ ~~10-4-99 9:50 AM~~ 15:30
~~10-4-99 7:25 10:10 PM~~ ~~10-6-99 8:25 AM~~
~~10-9-99 4:00 PM~~ ~~10-11-99 3:55 PM~~ 2.4

~~10-2-99 5:0 PM~~ ~~10-5-99 5:5 AM~~ 10:50 2.2 (2.0)
~~10-4-99 5:25 PM~~ ~~10-6-99 4:30 AM~~
~~10-10-99 8:30 AM~~ ~~10-13-99 6 PM~~ 11:23.5 5.1
~~10/10/99 3.0 pm~~ 2:50
~~10-2-99 7:40 PM~~ ~~10-5-99 5:15 AM~~
~~10-4-99 2:00 PM~~ ~~10-7-99 10:00 AM~~
~~10-12-99 3:15~~ ~~10/14/99 5:45 AM~~ 10-13-99 1:30 PM
~~10/10/99 3.00 pm~~ (clean)
~~10-2-99 9:10 PM~~ 10-4-99 3:11 AM
~~10-5-99 9:15 AM~~ ~~10-6-99 4:30 PM~~
~~10-8-99 7:40 AM~~ 10-11-99 9:50 AM

Pt 66
#5 Gold grid 4.92 plate 13.17
Silver scale dry much $CuNO_3$
3.6 amp hr 3.1 – 3.6 – 3.5 – 3.3

~~#10~~ Pt 66
~~#10~~ Gold 4.84 plate ~~14.34~~ ~~13.40~~ 12.75
Silver flake scale Cu acetate
3.5 amp hr – 3.0 – 1.9 – 2.5 – 3.2 – 2.7 – 2.4

#11 best of grid fine scan scale
m.35 4 amp hr
m.23 – 6.0 – 5.7 – 6.4 – 6.0 – 6.2 – 5.6 – 5.6

#12 best of plate silver flake not ~~#11~~ 12.75
but used at 35 – 6 amp hr
at.25 5.9 – 5.6 – 5.6 – 5.8 – 5.0 – 4.2 – 4.4
4.5 – 4.75 – 5.0 – 5.0 – 4.3 – 3.4 – 4.2 – 5.0 – 5.5

Pt 66
~~#9~~ Gold electron scale
3.6 amp hr – 2.5 – 2.9 – 3.4 – 3.3 – 2.9 – 3.4

3-15
~~10-3-99 12:30 P.M.~~
6-45
~~10-4-99 8:55 P.M.~~
3-10
~~10-6-99 9:40 A.M.~~
~~10-7-99 3:[illegible] P.M.~~

1-45
~~10-4-99 8:50 A.M. 1:5 P.M. 10-2-99~~
~~10-5-99 10:0 P.M. [illegible]~~
~~10-11-99 10-2 A.M.~~ 10-13-99 8:30 A.M.

9-15 70-55
~~10-3-99 6:30 A.M. 10-4-99 7:35 A.M.~~
~~10-6-99 10:50 A.M. 10-9-99 8:35 A.M.~~
~~10-10-99 5:50 A.M.~~ 10-11-99 10:20 P.M.

70-30
~~10-2-99 7:55 P.M.~~ 10-4-99 8:30 A.M.
10-40
~~10-5-99 7:20 A.M.~~ 10-11-99 4:30 P.M.
~~10-6-99 9:45 A.M.~~
~~[illegible]~~

~~10-2-99 9:15 P.M.~~ 10-3-99 9:25 P.M.
3 8-25
~~10-5-99 8:0 A.M.~~ ~~10-6-99~~ 8:25 A.M.
~~10-7-99 10 A.M.~~
~~10-10-99 8:35 A.M.~~
~~10-3-99 11:15 A.M.~~ ~~10-7-99 11:30 A.M.~~
~~10-4-99 3:30 P.M.~~ ~~10-9-99 2:15 P.M.~~
~~10-5-99 8:20 P.M.~~

see pp 65
#13 grid 5 gr - plate - 13.19
silver bake plate soaked in $CuNO_3$ + burned
3.8 of bk - 2.4 - 1.9 - 1.2 - 2.9 - 2.1
When taken out have fit in grid.

pp 67.
10.52 gr surf - scale, reduced & replaced
04 - 4½ of bk - 3.6 - 4.15 - 4.2 - 4.1 - 4.2

pp 67
#14 grid 5.09 gr plate - 13.61
silver bake plate soaked in acetate burned
3.4 - 3.4 - 3.9 - 3.5 - 3.4 - 3.1 - 2.6

pp 67
#15 grid wire 5.82 scale 9.87
surf scale, fine on wire in grid
2.4 of bk - 2.4 - 3.0 - 3.30 - 3.4 - 3.3
3.5

pp 65
#16 grid 5.46 gr scale 12.64
burned scale, fine powder
1.3 - 1.4 - 1.5 - 2.4 - 2.4

pp 65
#17 grid gr plate 13.44 after dip 13.92
Silver bake plate dip 5 times in HNO_3 + burn
3.4 - 2.4 - 2.5 - 2.0 - 2.0

~~10-3-99 8:20AM - 10-4-99 8:45AM~~ 10-30

~~10-5-99 8:45AM - 10-6-99 8:45AM~~ 10-30

~~10-7-99 8:35AM - 10-10-99 8:40AM~~

~~10-12-99 10:20AM~~

~~10-4-99 8:55PM - 10-10-99 10:20AM~~ 4.30

~~10-11-99 8:15AM~~

~~10-7-99 1:45PM~~

~~10-10-99 8:45AM - 10-12-99 5:20PM~~ 5th

~~10-13-99 8:15AM - 10-14-99 5:20AM - 5PM~~

~~10-15-99 5:45PM - 10-16-99 8:35AM~~

~~10-17-99 8:35AM - 10-11-99 10:20PM~~

~~10-10-99 8:35~~ ~~10-11-99 8:15AM~~

~~10-12-99 8:45~~ ~~10-13-99 8:30AM~~

~~10-14-99 9:10AM~~ ~~10-15-99 8:45AM~~

10-19-99 9:45AM.

~~10-20-99 8:20AM~~ ~~10-21-99 8:50AM~~

~~10-22-99 [illegible]~~

H.67

gt. lake up. rock. worked unusual time and separated when opalescent -
2.0 - 2.9 - 2.8 - 3.8 - 3.6 - 3.6 - 3.4 -

H.66 -

Pt. Pt grid 6.17 fell with reduced up. scale total wt. 14.67 of 2.4 after
Pt Pt grid. 6.14 loaded -
Coarse metal scale 0.5 - 1.1 - 0.7
Pt Pt of plate 14.84 on -
Silver lake ok. remove with HNO_3 solution - 5.2 - 5.2 - 4.0 - 2.8

H.66 -

H.20 About 12 gm. Au definite and frequently small - and burned out -
1.8 - 1.8 - 1.8 - 1.2 -

Pt Pt plate 11.68
Silver lake ok. HCl hydrate solu small lump - 2.4 - 1.9 - 1.9 - 2.0 - 2.2 - 3.0

H.67.

Pt Pt plate 9.6 -
Wrap 15 gm Silver lake ok - 7/2 $CuNO_3$
3.0 - 3.1 - 2.1 leaks

The anodized tube plates are 27% Vanad

#3 Mt plate A 10.4 gr
Pulled scale and under 2.00 –
2.4 – 1.8 – 1.9 – 2.2 – 1.6 – 1.2 – 1.6 – 1.1 –

#5 Oxidized Cu anode from bomb in muffle 1.1 – 1.5 – 2.0 – 1.7 – 1.2
.9 – 1.1 – 1.3 – 1.8 – 1.7 –

#29 Mt plate 11.4 Silver tube of 15 gr grafting – 2 gr
3.5 – 3.9 – 4.5 – 4.4 –

#15 Mt plate 12.1 Silver tube of 20 gr 2 gr bicarbonate –
3.8 – 4.5 – 4.1

#6 Mt plate 11.3 ordinary plate reduced reduced in pure hydrogen
3.6 – 2.9 – 3.0 – 3.4 –

#16 Reduced plate scratched in Cu SO4 + plated in 3 Tenths
3.5 – 4.2 – 4.1 – 1.6 – 3.0 – 2.0 – 1 –

~~10-12-99 9-20AM~~ ~~10-12-99 9-40AM~~
~~10-12-99 8-55AM~~ ~~10-12-99 5-15PM~~
10-13-99 2 P.M.
~~10-12-99 8-50AM~~ ~~10-12-99 5-15PM~~
~~10-12-99 10-10 AM~~ ~~10-12-99 2-30PM~~
~~10-12-99 10-30~~ 10-13-99 8-40AM

~~10-12-99 9-30AM~~ ~~10-12-99 5-45PM~~
~~10-12-99 4-40PM~~ Rim 6h 30m by R.
8/10 10.30 am light fine
~~10-12-99 1-40PM~~ ~~10-12-99 5-15PM~~
~~10-13-99 8-30AM~~ ~~10-13-99 2AM~~
~~10-10-99 7-30PM~~ ~~10-12-99 6PM~~ ~~10-12-99 10-20PM~~

~~10-13-99 10-45AM~~ ~~10-13-99 8-15AM~~
10-13-99 7-35PM

~~10-12-99 8-25AM~~

~~10-12-99 3-30PM~~ ~~10-13-99 10PM~~
10-13-99 ~~2PM~~ 3-20PM ~~10-14-99 10-25AM~~
~~10-11-99 11-20AM~~ ~~2-40PM~~ ~~10-10-99 2-50PM~~
~~10-12-99 8-45AM~~ ~~10-12-99 10-15AM~~ ~~8PM~~
~~8-20AM~~ ~~2PM~~ 2-20 1-50

#7 Anaely by electr. based in H.
3.5-3.6-4.0-3.4

#8 Opt. 10.4 gr. ordinary grid reduce, anaely & heat in H. - 2.0-2.4
2.8-2.8-3.0-

#10 Silver Roche ox with coal tar -
3.6-4.7-4.5 - 4.5-4.1

#12 Opt plate 9.4 a specif by L anaely. hydro reanaely, & heat in H. -
1.7-1.6-1.7-1.6-1.7-1.4-1.9-

#13 Common plate reduce in sugar sol. & burn twice reduce again & anaely -
4.5-3.4-3.4

#15 Common plate reduce reduce in Hg -

#20 Specif Gr anaely mould allow to harden & heat in H.
.2-.4-.3-.4-.5-.2-.2-.3-.2-.1

~~10-12-99 4:30 PM - 10-14-99 8:30 AM~~ -
~~10-12-99 10:40 AM - 10-19-99 11 AM - 10-19-99 6 PM~~ -

~~10-13-99 11:50 AM - 10-14-99 2:40 AM~~
~~10-17-99 11:10 PM - 10-19-99 8:40 AM~~ - 23/10-99 7.34 m
rather clear

~~10-13-99 2:30 AM - 1:15 PM - 5:30 10-14-99 9:40 AM~~
~~10-17-99 10:40 AM - 10-17-99 6:40 PM~~
~~10-17-99 2:15 PM - 10 - 6:00 PM 2:15 - 2-30~~
~~10-13-99 12:20 AM - 1:30 PM - 10-14-99 10:15~~
~~10-14-99 10 PM - 10-14-99 10:40 AM~~

~~10-13-99 11:15 AM - 10-14-99 2:15 PM~~
~~10-17-99 11 AM - 10-19-99 7:30 PM~~ -

~~10-13-99 1:20 PM - 1:30 PM - 10-14-99 2:30 AM~~
~~10-17-99 9:50 AM - 11 - 10-19-99 8:30 AM~~
~~10-17-99 10 AM~~ 10-19-99 8-30 PM -
10-14-99 ~~10:20 AM 11 PM~~ 10-19-99 2 PM.
7h. by R. 24/10 2.45 pm not clear

~~10-13-99 8 PM - 10-14-99 10:40 AM~~ 10-19-99 1 PM.

#3 Z precip Cu amalg. harden, reamalg. harden burn in A -
2.7 - 2.8 - 2.5 - 2.8

#8 Oxid reduced + amalg -
2.6 - 2.9 - 3.0 - 4.0 - 3.9 - 3.5 - 4.0

#9 Electro amalgam -
.2 - .1 ~~- 1.0~~

#14 Ppt Cu tinsel 6.24 in grid.
.2 - .4 - 1.2 - .4 - 1.0

#15 Transfer to NaOH sol. see pp 67
.5 - 3.2 - 2.8 -

#16 Tinfoil soaked in Cu NO_3 + burned 20 x
.4 - 1.1 - 1.1 - 1.1 - 1.2 - 1.1 - 1.2 -

#21 Oxidized plate acted on by $AgNO_3$
2.6 - 3.4 - 3.8 - 4.3 - 3.0 - 4.1
4.0 - 3.2 - 3.4

22 Old #7 plate KOH with KSO_4
3.9 - 3.9

~~10-18-99 8:30AM~~ clear
10-18-99 8:30AM. (6h 30m by R) 27/10 10:30 am

~~10-18-99 8:30AM~~ 27/10 99 9:00 am 27/10 9:00 am
~~10-18-99 8:30AM~~ / clear
10-19-99 11AM. (7h by R) 27/10 10:00 a.m.

~~10-18-99 8:30AM~~ ~~10-18-99 8:30AM~~ very clear
10-19-99 7:30PM (1 hour by R)
27/10 7:30 a.m.

~~10-18-99 8:30AM~~ ~~10-18-99 8:30AM~~
~~10-18-99 8:30AM~~ 10-18-99 1PM
not very clear
~~10-18-99 8:30AM~~ (cloudline)
~~10-18-99 8:30AM~~ (Run 13h 30 by R)

~~10-18-99 1:55PM~~ 27/10 8:30am (clear)
~~10-18-99 8:30AM~~
10-19-99 7:30PM (1 hour by R)
10-17-99 8PM 9h 30m by R Blue

27/10 99. 9 am very clear

27 Silver lake ox. thru 200 mesh
4.4 - 3.9 - 4.1 - 4.2 4.2 - 5.5 - 5.0
4.5

28 Silver lake ox. with charcoal -
3.0 - 1.5 - 2.0 - 3.5 - 2.1

29 Silver lake ox. with graphite -
3.4 - 3.0 - 2.75 - 3.5 - 2.75 - 3.3

30 Silver lake ox. ZnO -
2.5 - 1.5 - 2.0 - 1.6

31 General mixture -
4.1 - 4.7 - 4.9 - 4.5 - 4.3

32 Lake sup. soak & Tar -
3.5 - 3.2 - 4.0 - 3.4 -

33 Ordinary gold -
5.1 - 6.1 - 5.0 - 5.5 - 5.5 - 5.4

34 Cut of plate 13.4 gr. AgNO3 1 gr. CuO 40
cement with water -
3.5 - 3.2 - 2.9

22/10 97 9.30 am (clear)

~~[illegible]~~ am (clear)

23/10 97 9 30 am rather clear

23/10 97 11.00 am mud on the gelatinum

23/10 97 9 30 am clear

23/10 9.30 am dark blue when charged [illegible]

24/10 9 30 am dark blue when charged

25/10 9 30 am light blue on charge

23/10 9.30 am light blue on charge

#5 Potatoes much 14.5 gr.
5.0 - 4.5 - 5.1 - 4.1 - 4.8 - 4.8 - 4.0

#19 12 gr. Ox from $CuNO_3$
3.25 - 3 - 2.75

#21 12.5 gr. 3/4 sticks potatoes & 40 gr.
3.0 - 1.5 - 1.75

#23 17.6 gr. Lifeye 15 gr. Ox 40 gr. soda
3.75 - 2.6 - 3.3 - 3.6 - 3.1

#X Glucose
3.5 - 3.1 - 3.5 - 3.9

#X Wt 12.6 Bi sub nit 6 gr. Ox 40 gr. soda.
3.1 - 1.9 - 1.7

#9 Wt 13.6 Bi sub nit 6 gr. Ox 40 gr. $CuNO_3$
4.5 - 2.25 - 2.8 - 2.2

#28 Wt 15 gr. Stannum ox 6 gr. Ox 40 soda.
3.8 - 3 - 2.5

#26 Wt 14 gr. Stannum ox 6 gr. Ox 40 $CuNO_3$
3.6 - 3.4 - 3.25 - 3.7 - 4.8 - 3.6 - 4.1 - 3.9

23/10 77 ~~9.00~~
rather clear

~~23/10 77 9.00~~ 23/10 10.30 am

23/10 77 ~~9.00~~
yellow & red ppt. changed

23/10 77 ~~9.00~~
very unclear

24/10 77 9.30 am 24/10 10.30 am
Little clear

24/10 77 ~~9.00 am~~ 11.30 am
clear

24/10 77 ~~9.00 am~~ Arth molt

24/10 77 ~~9.00 am~~ 11.30 am rather clear

24/10 77 ~~9.00 am~~ rather clear

#8 11.8 gr 4 gr Bar 40 oz. $CuNO_3$ 24 hydrate
3.5 - 3.75 - 3.1 - 2.8 - 2.3

#20 Mn 0.6 gr 40 oz. acetate 9.8 gr
3.25 - 1.9 - 1.8 - 1.9

#24 Mn 0.6 gr 0 oz 40 gr $CuNO_3$ 13.8 gr
3.75 5.25 - 4.1 - 3.1 - 3.3

#26 Mn 0.6 gr 0 oz 40 g $NiNO_3$
3.25 - 3.6 - 3.1 - 3.7

#17 Oxide from hydrate - 13.2 gr
2.4 - 1.9 - 2.5

#15 Cement with $FeCl_3$ - ~~5.4~~ 8.4 gr
1.37 - 1.25 - 1.5 - 1.5

#12 Cement with $MnNO_3$
7.6 - 5.4 - 5.3 - 5.3 - 5.3 - 5.3 - 5.0

#30 15.2 gr Cement with Cont. Cl. what is good
1.6 ± 1.5 - 1.5

#13 14.9 gr Cement with Lithia hyd
3.6 - 3.25 - 3.1 - 3.0 - 3.6 - 5.0

23/10 97 From
Wing Wills Blue

1.15 gr Lith Carbonate with [illegible]
3.6 - 3.5 - 3.5 - 2.8 - 3.0

AgNO3 10 g. Sols Sale 40 g. [illegible]
3.1 - 2.7 - 2.5 - 2.6

Valentine mixture
3.8 - 3.8 - 3.5 - 3.5 - 3.9

Litharge 15 g., [illegible] 40 g.
3.9 2.1 2.0

a ~~14~~. R.Y.g (17.5 w. frame)
Br. sub. nitr. by Sibs. P. 40 soda
2.9 - 2.4

~~15~~. 13.1 g (w. frame 13.3)
Br. sub. nitr. by Sibs. P. soda
4.1 - 3.6 - 3.5 - 3.5 - 3.5 - 17 - 33.35

~~17~~ 13.67 (w. frame 18.99)
Frame ex by Sibs. 40 soda
3.0 - 2.8 - 2.4 - 2.5 - 2.1 - 2.0

~~18~~ 13.1 g Glucose
4.0 - 2.5 - 3.3 - 2.5 - 2.0

28 (114 g)
(7) Borax 4g Silvik CO_3 ~ 1 a
2.4 - 1.9

32 18.0 g 15.5 g
(8) Borax 4g Silvik CO_3 $CuNO_3$
2.9 -

10 13.18 g
(10) MnO_2 6g Silvik 40 ~ 1 a
1.5 - 1.5 ~ 2.0

35 8.7 g
(9) Cement with $FeCl_3$
1.3

11 13.6.2 g.
Mn O 6 [illegible] Co. Cu NO_3
2.1 – 2.3 – 2.8

12 14.7
Cement with $Ni(NO_3)$
3.3 – 4.1 X 2 4.0
with liquid
5.0

13 12.0
Cement with [illegible]

14 11.4 g.
With Carb. w. soda
2.2

4 ~~32~~ 11.2 g
CuO with coal tar
3.5 - 3.0 - 2.5 - 3.3 - 3.1 - 2.9

~~3~~ 12.6 g 2 14.6 g
Copper made from chloride of copper
Lib. much (3.3 g)
5.5 - 5.3 - 6.2 - 6.67 - 5.2 - 5.5

~~24~~ 11 g. [illegible]
[illegible] 37.7 g [illegible]
20 – 28 – 27 – [illegible]

~~25~~ 14 g
[illegible]
3.3 – 33 – 30 –

#18 12.95 g
Precipitated Copper w. Sugar solution
12 3.3 [illegible] – 40 – 30 – 45

Clear

7 (13.15g)
Precipitated Copper w. Silv. acetate in Amm.
3.5 - 3.0 - 2.8 - 2.8 - 2.0 - 1.5

9 (14.05)
Precipitated Copper with Boll. mixture
3.4 - 4.1 - 3.5 - 3.4 - 3.2 - 3.8 - 4.0

34 (15.05)
Precipitated Copper w. Cu Cl in Amm.
4.4 - 4.2 - 3.9 - 4.2 - 4.5

Mück A.

Rosen	100	42.5 %
Wasser	125	53.25 %
Soda hypl.	10.	4.25 %

Soda solvit 1:2 in Wasser

Mück B

Rosen	100
Wasser	125
Soda hypl.	10

Residuum à 33.

~~#33~~ (13.05 g)
40 g CuO, 3 g Mück A
3.0 – 2.5 – 2.5 – 3.3 – 2.9 – 3.1 – 2.0

~~34~~ (13.40)
40 g CuO, 3 g Mück B
3.6 – 3.1 – 3.5 – 1.8 – 3.2 – 4.1 – 4.1

40 (13.17)
40 g CuO 4 g Mück A
3.3 – 3.0 – 3.4 – 3.1 – 4.0 – 3.0 – 3.1

#4 ~~28~~ (13.57)
40g CuO 2g Mnch A
4.2 - 3.8 - 3.6 - 2.8 - 3.9 3.1 - 3.5

#X (14.75)
40g CuO 3g Mnch A
Dipped in $AgNO_3$ and washed
4. 5.8 - 6.2 - [illegible]

#X (7.43)
40g CuO 3g Mnch A
2.8 - 2.[illegible]

~~31~~ (12.65)
40g CuO 3g Muck A
3.8 - 3.0 - 2.8 - 3.9 - 2.8 - 3.1 - 2.9
3.1 - 3.3 —

~~32~~ 14.3g
40g CuO 3g Muck A
Digested in KCN and washed.
4.3 - 4.

34 (14.9)
CuO 40g 3g Muck A
Digested in $Cu(NH_4Cl_2)$ and washed
repeated twice
4.3 - 3.9 - 3.2 - 4.1 - 4.5 -

~~2~~ 10.75
upper billiards, pressure [illegible]
3.31 – 3.5 – 3.8

~~2~~ 6.7
[illegible] with [illegible]
4.0 – 3.5 – 3.9 – 3.2 – 3.1

~~2~~ 12.95
[illegible] with Petch [illegible]
3.5 – 3.0 – 3.0 – 3.3

Mixture C.

Rosen 40 %
Wein 50 %
Soda 10 %

dark blue

11.7 g

32

#X CuO. 40 g Bell Mixture A 3 g
Silver Vessel containing ca 15
stripes 300 × 20/100

3.7 – 3.9 – 3.0 – 3.8.

39. 40 g CuO. 3 g Mixture C.
Vessel at 50 ohm
(Vessel ca 350 ohm) 14.20 g
3.9 – 4.1 – 4.1 – 4.0

35 CuO from CuSO4 12.5
3.8 – 3.2 – 3.5 – 3.2 – 3.4 – 3.5 – 3.6 – 3.4

Mick D

Rosin 47.5%
Water 50%
Soda 2.5%

Dark blue

#X. 40 g CuO 3 g Mick C
pressed 375 atm 13.9 g.
4.1 - 3.2 - 4.3

#29 11.7 g
40 CuO 3 g Mick A
Dipped in $CuCl_2$ & washed
2.7 - 3.1 - 3.2 - 3.0 - 2.2 - 2.9

#30 CuO from acetate
[illegible] Nobrumbrey [illegible] 13.00
3.4 - 3.5 -

#32 [illegible]
(13.25 g.)

#22 Flesh cordis [illegible]
[illegible] no frame
5.3 - 6.2 - 4.0

#~~4~~ 10.80
[illegible]
[illegible] table; [illegible] A
[illegible] reducing: 6.2 [illegible]
pieces
28 - 3.1 - 3.4 - 3.0 - 1.5 - 2.3 - 2.1

#X 10.5 [illegible]
[illegible] table A, 10.6
[illegible] reducing 5.9 [illegible]
[illegible]
18 - 1.6 - 1.4 - 2.0 -

7 8.3g

CuO (Silver Lk.) with 10% Charcoal

40% > 100 mesh [illegible]

5.60 AH [illegible]

1.8 – 2.5 – 1.0 – 2.0

~~2~~ 6.05g

CuO (Silver Lk.) with 15% Char

40% > 100 mesh [illegible]

3.9 AH for [illegible] reduction

1.5 – 2.0 – 1.0 – 1.5 – 1.1

51%

~~2~~ 6.55g

CuO (Silver Lk.) with 20% Charcoal

40% > 100 mesh [illegible]

4.6 AH for [illegible]

1.5 – 3.0 – 1.0 – 1.5 – 1.0 – 2.5 – 2.8

2.0 – 2.1 – 2.2 – (55%)

#4 ~~X~~ 8.25 g
nO (Cals Pt) with 10% Mn O
Boil much D
5.75 AH for first reduction
2.5 – 2.5 – 2.0 – 2.0 – 1.8 – 1.5
50%

#~~11~~ 9.2 g
Precipitated Cu with 5% Charcoal
10% Manganese Stick with Copper
First reduction 5.8 (98%)
Reduction 2.6 – 2.5 – 2.4 – 2.5
46%

10.75 g
Precipitated Cu with 5% Charcoal
10% Manganese Boil much D.
First reduction
Reduction 3.1 – 3.0 – 2.4 – 2.8
2.5 – 2.6 – 2.6

20. 9.0 g
Precipitated Cu with 10% Charcoal (49 x 10)
Leach with Soda
First reduction 5.
Oxydation: 2.6 - 2.5 - 2.0 - 1.5 - 3.2
2.4 - 2.1 (50%)

21 9.9 g
Precip. Cu with 10% Charcoal (40 x 10)
Boil much B
First reduction
Oxydation 3.0 - 2.6 - 2.0 - 20.3.2
2.2 - 2.0 (49%)

23 6.5 g
Pre. Cu with 20% Charcoal (41 x 10)
Much TB
First reduction 4.2 (45%)
Oxydation. 2.0 - 2.0 . 1.5 - 1.5 - 1.2
1.7 - 1.4 (45%)

Clear - light blue.
Spongy stuff from Kalkode, covers the bottom

Clear - yellow -
something on Platinum, bottom almost per.

#9 5.6 g
Free Cu with 30% Charcoal
Ball much Ti
Just reducing 3.4 (90 - 75)
Explosion: - - B[illegible]

#10 9.7 g
This and following plates burned (carbonized) in powder of charcoal
5% Charcoal 95% CuO, with coke
Turpentine in Bengal / after burning reducers in H2 gas contact
15 - 16 - 15 - 15 - 2.5 - 2.6 - 2.8 - 2.9 - [illegible]

#17 20.1 g
as #10
49 - 46 - 25 - 53 - 38 - 15 - 25
(72) (175)

intensive blue on bottom
clear - yellow - intensive red.
Free from Rubb. from bottom.

Blue on bottom (½")
grey - yellow - red
some pass from Rubb. on bottom.

Blue streak from bottom, light red, bottom
rubber free

80 14.1g
5% Charcoal, 95% Prec. Cu. -
10 ml) Wood Pitch in Benzol
(residues, after burning in H)
2.3 - 5.4 - 4.7 - 5.5 - 5.6

81 13.95g
As # 38
2.3 - 5.7 - 5.1 - 5.5 - 5.4 - 5.1 -

78 (14.6g)
5% Charcoal. 95% Cu prep.
Boll much R. (in H)
2.3 - 5.7 - 5.1 - 5.6 - 5.1 - 5.6 - 5.

Dark blue on bottom
High red - not much on bottom

X yellow - deep red
Plenty pres on both and bottom.

X Like # 27.

9. 13.55
5% charcoal, 95% Cu prep.
Boil much A
2.3 - 5.7 - 4.8 - 5.5 - 5

27 (1.4.8)
as # 9 5 # 18
2.3 - 5.7 - 5.1 - 5.6 - 5.3 - 5.6

X 12.7
as # # 9.18 - 7.
7.8 - 3.5 - 3.6 - 2.7 - [illegible]

✓ yellow - high red.
Pearly gee on Kath and bottom

#24 10.85 g
5% Charcoal 95% Cu O, silk [illegible]
1.3 - 1.6 - 2.0 - 1.5 - 1.7 -

Dark blue on bottom
Subtransparent brownish red.
Bee on Kath & bottom

[illegible] (9.9)
as #24
1.4 - 2.5 - 2.3 - 2.1 - 2.5 2.2

Blue from bottom upward.

[illegible] (9.65 g)
as #24, 32
1.3 - 3.5 - 2.0 - 2.0 - 1.7 - 2.0

[illegible] 9.0 g
as #24, 32, 8
1.8 - 2.0 - 1.7 - 2.4

#37 8,8 g.
95% Cu powder 5% Charcoal
Pitch in Benzene
3.0 - 1.6

#3 Weight recovered 13.1 g
Pitch washed off
5.6 - 5.1 - 5.1 - 5.6 - 5.3

#35 Plate of Fe, Ni, 4% charcoal 40 > 100 mesh, Pitch
Weight 8.7 g — lost in
Cu Mo and water
4.4 - 5.1 - 3.6 - 2.2 - 2.3 - 1.1
75% 8.7% -

137

#36 10% Charcoal

Much K

39 - 31 - 45 - 31

#29 95 2

39 - 35 - 28 - 41 - 31 - 8

31 X.Y.2

10% Charcoal

32.6 - 2.4 - 31 -

very clear, no precip on boiling

Clear

Clear

#5 Silv Coke - shiny [illegible]
hydr [illegible] 1/16
Red 10.2 AH
5.2 - 5.2 - 5.5 - 5.0

#6 14.5 g
[illegible] Clear, [illegible] Nitric
Potass
Red 9.0 AH Ox 4.6 = 48%
4.2 - 3.9 - [illegible] - 4.0

#12 Silv [illegible] Stick
Pyrovic aluminum 1/100
Red = 9.9 AH Ox = 4.6 = 43%
4.2 - 3.9 -

Clear

38 14 g
Silv Lake Still with
Engine Ammonia
Pres = 9.0 #
Ox = 4.2 # = 24.5%
40 - SV = 7.0 = 30

14 10% Cinnamon 90%
Silv Lake Still Ammonia
Required = 2 N.S. wanted
S: 8 g Rec 5.0 = 85%
Ox = 2.5 = 42.5% - 30 - 21 - 7

19 90% Cin Prec 10% Clove
and labor 40 = 100 work, Cap
Ammonia 11,95 g

#55 9.2 g
10% Charcoal - Like the Ball mill
Digested in $AgNO_3$ and washed
2.6 - 1.0 - 2.6 - 1.2 -

#23 7.6 g
20% Charcoal, 80% in Fire
burner (oxydized) shaken in
Cupr Ammonia

24 12.2 g
Like the shaken with
Ammonia, Digested in
$AgNO_3$ and washed
4.4 - 3.6 - 4.4 - 3.1 = 32

20 14.6 g
Like the shaken with KOH
Digested in $AgNO_3$ and washed
4.5 - 4.2 - 4.1 - 4.0 - 4.8
4.4 - 4.5 -

~~61 - 67~~

~~62 - 67 70 75~~

1 - 65 69

2 - 67 70

3 - 75 ~~72~~

4 - 65 68 77

5 - 61 69

6 - 68

7 - 67 70 72

8 - 67

9 - 64 69 77

10 - 66 78

11 - 62 74

12 - 62

13 - 65 70

14 - 67 ~~70~~

15 - 67 70 71 79

16 - 65 72

17 - 65 69 72 ~~71~~

18 - 66 70 76

19 - 64 69 74

20 - 66 74 71

21 - 64 69 80

22 - 67 69

23 - 65 69

24 - 65 71 77

25 - 66 69 76

26 - 65 69

27 - 68

28 - 68 79

29 - 68 76 83

30 - 65 70 71 78

31 - 68 80

32 - 68 75

33 - 80

34 78

Notebook, N-99-11-24

E 172 N991124

P. Rafin

/

Dimensions of plates used
58 × 20 × 3 mm

Electrodes of CuO (Silver lake)

1) CuO with $CuNO_3$
35, 30, 1.7, 32, 2.1, 2.2, 2.5, 3, 2 amp hours

2) CuO with $Cu(C_2H_3O_2)_2$
3.5 3.0 1.9 2.5 3.2 2.7 2.4

3. ~

4. Silver lake plate soaked in $CuNO_3$
paste

5. Silver lake plate soaked in $Cu(C_2H_3O_2)_2$
3.4 ~ 3.9 ~ 3.5 ~

6. Silver lake plate dipped in $NiNO_3$
3.4 ~ 2.4 ~ 2.5 ~

6. CuO with $NaNO_3$ & Na_2CO_3
5.2 5.2

7 CuO and $NaNO_3$
2.4 1.9 2.0

8
Mixt: 15g Blue Lake ox. 7g CuNO3 Weight 9.5g
3.0 3.1

9. 11.4g Plate of Mixture
18g Blue Lake ox, 2g grape sugar
3.9 4.5

10
12.1g Plate of Mix
20g CuO 2g
3.8 4.3 4.1

11. CuO with Coal Tar
36. 4.7. 4.5

12 CuO through 20 Mesh
4.4

13 CuO with charcoal
3.0 15

14 CuO with graphite
3.4 3.0

15 13.4 g Plate of [illegible]
10 g [illegible] 40 g CuO with soda

16 Oxide and of Cu NO_3
3.5

17 Weight of Plate 17.6 g
CuO 40 g Litharge 15 g with Soda

18 Plate weighs 12.6
40 g CuO, Bi [illegible] with [illegible]
3.1

19 Plate 13.6
40 g CuO 6 g Bi subnit. with $CuNO_3$

20 15g Plate
Ammon. ox 6g. CuO 40g. soda
3.5

21 Ammon. ox 6g CuO 40g with Cu NO_3
3.6

22 11 8g
Borax 4g. CuO 40g Cu NO_3
3.5

23 (9.3g) MnO 6g. CuO 40g soda
2.25

24 (1.5g) 23 with Cu NO_3

25 6g MnO 40g CuO — Na NO_3
3.25

26 " 25 with Ni NO_3
3.25

2

27 Brief fra Nyholm Berg
2 X

Vilkaarlige rem Haten
Eindeken ikke rammer
u af sta sytbrigsed

1) CuO with Coalter - 11.2 g.
46.5 % - 40 % -

2) CuO with Pitch in benzol (12.95 g.)
40.3 %

3) Precipitated CuS.
NiS through $CuSO_4$ + aq.
Treated dry by warming, 2) passing
between filter paper 3) in H, which was
45.4 - 48.1 % -

4) CuS with Soda
60.3 %

5) Precipitated Cu (2 m. m. Cu_2O + O_2) with Fizeau solution (Oxydiert Probe heraus, macht durch Zusatz von Wasser)
13.9% –

6) Cu precip. with $Ag(C_2H_3O_2)$ –
39.7 – 34.2 %

7) Cu prec. with Cu_2O dissolved in Am
43.5 40.5

8) Cu prep. with Bell Mich. B
86.1 - 43.5

9) CuO from Cu ($C_2H_2O_2$)
(Melt. pow & decomp 240° C)
with Bell mich. B.
65.8 - 62.7

(Looking well pure when chem prep.)

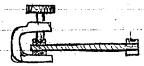
10. CuO from Cu_2O_2
(decomp by white heat)

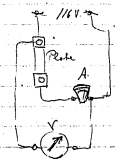
11) CuO from $CuCl_2$

12 CuO from Cu (CN)$_2$

13 CuO from Cu Br$_2$

Measuring the resistance of the plates (in fuel)





1) Plates with 3 g. Mixt. D

a) Plate moulded under 175 Atm. pressure in cylinder

$e = 116$ Volt $i = 0.039$ Amp.

$R = 2975$ Ohm

Square section = 19·4 = 76 ²" length = 0.05 ³"

Specific resistance (per inch square & inch)

$c = 42600000$

Spec. conductivity

$k = 2345 \cdot 10^{-10}$

234500000 as bad as Cu.

b) Plate moulded under 375 Atm Pressure

Size of Plate = 20×5 = 100 $\square^{cm}$.

Length = 5.3 $\square$ = 0.053 m

i = 0.034 A e = 116 V.

R = 3420 ω.

Specific resistance = 4900000

Conductivity = 2040. 10^{-20}

2) a) Resistance of Plate with 3/4g parts Nitrich A had a resistance = ca. 6000

b) Dipped in $Cu(C_2H_3O_2)_2$ and ashed at dark red heat

Resistance = ca. 3000

14 CuO from Cu_2O

15 40g CuO with 3g Mnch B.
40 2. 37.1

16 40g CuO with 2g Mnch A.
45.0.

17 40g CuO with 3g Mnch A.
34.2. 28.6 - 29.6.

#10 on 17
33.6 - 33.6 %

19 on 17
38.7 36.8

20 40 g CuO 4 g Nickel
34.0 %

#21
40 g CuO 3 g Nickel on impregnated in Cu NO3
and washed
40.4 %

#22 40g CuO. 3g mixed A.
Dropped in KOH and reboiled.
45%

#23 40 cons 3g mixed A
Dropped in Cu ($C_6H_4O_2$) and reboiled
replaced twice.
43.0%

#24.
40 CuO work 3g mixed A
Silver trimmed of 15 stripes 1/1000" 1/1000"
47.1 - 49.7%
(Silver probably burned)

#25
40g CuO 3g Urinic A
dissolved in $CuCl_2$ and washed

#26 CuO from acetate with Soda

27 Lib lake with 20% NH_4Cl.

28 Plat with silver lined

29
CuO from Acetate, 10% Lamp black, mich A

#30 10% Lamp black.

31 CuO, sub-lake, 10% Chrome brown, 90 g. 10 mich, mich B
3.39

32 [illegible]
[illegible] % charcoal
[illegible] charcoal

33 20% charcoal [illegible]

34 [illegible] with 10% [illegible]
[illegible] % 8.35 g

The [illegible] Calcy with [illegible]
bleach & [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
HCl (or HNO_3) (Acids).

Till [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible]

35 9.7 g
Free Cu with 5% Charcoal 4 hrs 100 mesh
for a
121 Ref.

36 10.75 g
Free Cu 50% Charcoal
mesh

37 9.007
Free Cu; 10% Charcoal for a

Iodine does not burn at higher 15% of Charcoal.

38 9.9 g.
Pure Cu, 10% Charcoal, Mixed

39 6.55 g.
Pure Cu, 20% Charcoal, Mixed B

40 5.6 g.
Pure Cu, 20% Charcoal Mixed B

24/11 99

The Porosity alone [illegible] not change the [illegible] much. It gives a very bad oxydation on account of the [illegible] [illegible] [illegible].

Tried to combine Porosity and Conductivity by using [illegible] [illegible] Plates with the Charcoal. Charcoal needs yellow heat for burning out, at which temperature the [illegible] [illegible].

CH_4Cl gives up Cl, which attacks the [illegible].

[illegible] needs yellow [illegible] [illegible].

24/11 99

Jeg har til hensigt samtidigt at prøve følgende:

En plade af 10–15 % Charcoal (af [illegible] størrelse) [illegible] og dyppes som [illegible] et [illegible] for at [illegible] kunde tilsammen [illegible] dem [illegible] ikke kunde [illegible].

Bifnoi: Et par plader dyppet helt og forsølvet med forskjellige [illegible] All

3) Pole Plade dyppet godt i [illegible] $AgNO_3$ [illegible]

4) Plade gjort porøs ved CH_4NO_3 med sølv [illegible] [illegible]

– Tror nu ledningsevne spiller hovedrollen – og ikke Porøsiteten væsentlig.

#41. 25/11 99

Bell Uncle Peake (cont.)

15 ? [illegible] i [illegible] [illegible] af ca 3/32" [illegible] [illegible] [illegible]

2.10 (0.716 Amp.)

Kopperplademaskiner [illegible] med sølvplettering og elektrolyse [illegible] gravplader. Vil derfor [illegible] at bestryge plader med tal eller [illegible] [illegible] hele overflade med [illegible] af de [illegible] [illegible]

Hvorfor [illegible] forsøg at reducere [illegible] [illegible] [illegible] at [illegible] pladerne [illegible] en [illegible] [illegible] [illegible] plade, der [illegible] [illegible] for overflader.

Opgave!

Delvis på grund af mine ideer fra

Schema:

= Bestandteile O. Amm. am
Trennschlüssel of petrous const.
1st reduct. n AH of %
Oxyd. am AH
of %

Force; applied rev. dir. and
O rev. for rev. 1a, 3a
Force

28/III 94

E. proposed iron: Bi: [illegible]
oxyd. in CuO; altera bar
in phenol 50% for meat
[illegible] for [illegible] well [illegible]
Tooth brush [illegible] needle
and et syphilis [illegible]
of prosecut. det. not [illegible]
by elektr. light in [illegible]
which - of oxyd. and. [illegible]
lange. Wozu [illegible] effer [illegible]
[illegible] rev. [illegible]
by mind. [illegible] at der vorop-
cost. [illegible] might [illegible] at [illegible]
effer [illegible] needs. [illegible] die [illegible]
for [illegible]

Typ. gimbages. Og. valg.:
in Plate: 64 x 26.6 mm
one plate: 3400 mm
1/100 mm lag; Vol = 3.4 mm³
meat 0.3026 g. Strongium
titrat: 13.55 AHO (0.25 x 54 1/2")

Nye Yesterday:
1) En gut del platina med Ball
mitch nonbret. amount of guide
2) En all platina det en potassium
of mind brunsk carbon
sp at retinceres.

Grunt exp.
Reproduce ut EMF of Zn O Zn
element till 0.372 V. 1 g from st.
~~[illegible]~~ 0.42 V

M. Söndag: Forsøgt om glødhalen
paa en principielt lav og bort
reverse electrolyt.
Forbøjelsesvinkel glødhal – anbelte
bryntne, sengende glødhal, dannelsen
afhænger af ved bøjning, lav
dig udbredte tykkere afbøjning
dannes ikke; —

7/12 Paa den fundet, hvor specielle
gunstige forhold, kommer det tag-
ble skadelig bortmaskinit addere
Hvor paastod i den anledning, at
jeg maatte ha prøvelet polyne
Prøvede senere Na_2SO_4; $NaClO_3$
uden resultat.

Prøvede reverse strømme hent
på at en rotiesalet varke paa stella
dunne løsts dersiet delvis mæters
electrolyte blev Nylet-bum (under
sanitarydig kunstlysgas praktisk
benyttede af mange lærere)

Bottom covered, not from
Kill alone.

41.

(10) Reg. Cr O + P all much
[illegible] short [illegible]
x Höhnford 15
Prev: 9,5 AH = 95 %
Ox: 4.8 = 48 %; 4,8 - 6,2 - 6.6
6.6
7/1 1907 Dense white [illegible]
[illegible] 75 [illegible] of
[illegible] [illegible]

5/12 99

Vervolgens van side 25

Effie aan geslig maagde trouble
28/11 op 29/11 pik gedurig ongeduldig
29/11 rotsaar en gaat van much
Effie afmaas Baker op zoo 26 plaats
Belspaken op Cu2O pree op
Belspaken op Cu2O rier lk.
1 Belspoorte met Mick A
op Pitch op Woortsar i Denyal
30/11 Donderdag dag. Oplaadde op
Belle 134 mm brandte de nacht
plaats mijn Koney i endigde met
Pakuilstor. Tre op fine hardmaas
lysiches, en smeltech. Cog
en Loosing op 6 plaats: 3 op Cu2O
op 3 op Cu pree beide met Pitch
pakind op diffen Mesdans en mis
rock op Oxydeerbs pofgeg tot. delle
Bordes pad rest op verscade de
in Mr Effie. Plaatsing op Cu2O trek
uhyplig zoo de snot pofgeste van
met other snot kinde tuels
op dense

Also die Hyperblau
erst hindurch, nachher grau
Rotbraun

42 (10)
95% CuO. 5% Charcoal (40>>100)
Pitch in benzol

Blau – gummiartig und nicht, hys.
hindurch nachher klar.

43 (17) Same 10

Erst nur braun blau grau hindurch,
grau – gelb, rot (nachher.)
Zuletzt hindurch grau Rath.

44 95% Free CuO 5% Charcoal
Pitch – benzol

Blev fraskilnden grøn gul ved
Brundfelt.

alle metal bar reduceret v. H_2

Blev fra brunden — hvor ved
Temperatur fin for brundfelt.

Mørke blev fra nedsm. — hvor ved
efter en stund dø ogs.
alle ede brundfelt.

45 (ii)
from 44: 95% Cu Prec. 5% Carbon
Filter

46
Precip Cu 95%, 5% Charcoal
Ball mill A.

47(a) from 46
95% Cu Prec 5 Charcoal
Ball mill A

gul dybrod
Plenty bundfald.

To Force corn 48.

gul - hårrod
Plenty bundfald

48 (17)
do 8-47 95% Cu proc. 5% Chloc.
Pole mind A.

49 (17) Sorn 46, 47, 48.
Cu, Mind ok.

50 (17)
95 % Cu 5% Chlorcu
mind A. dårlig contact

Blea fra bünden generel ingen
[illegible] brunn
Endel bindfelt

V. Aa fra bünden.

51 (12)
95% Cu O 5% C
Mich A

52 (B)
som 50, 57 Cu O - C Mich

53 (H)
som 1 ovfr.

2/12 97

Celle #92 - 053

Ilt. forsøget som oxygenbrænder. Stålet fremme blev ellbine men af min ingeniørmæssige, skulteli, morke betræne, som det var muligt at bestemt at ikke præge tilsæmmelsen for ox. skæring. Forøvrigt alle oxygene ca. 5 SCH for ved reduction af betænkelig dette tilfælde hinstof mangel.

Celle viste sig ogsaa ved ved at skidnes, ilt at de for samme blev forsøget med ny flint.

5/12 29

[illegible]

6/12 - 29

[illegible]

[illegible] med Chloral [illegible]
og ikke [illegible] Supr... [illegible]
[illegible]

En god latter, da E forsøgte at tone SO's skæmmeste.
[illegible] ... [illegible] i "[illegible]" [illegible] [illegible] for
[illegible]. Han [illegible] at
[illegible] [illegible] [illegible]
[illegible] Grejen

11/12 Sgaarafts-borde og E hen hele tiden. Mens jeg arbejdede ude i "kemi" har han [illegible] rundsøgt mine hefte, bøger, Timestat, kemiske fotoplader etc. [illegible] [illegible] at mærke paa ham.
Brændte i dag plader – 5 af hver [illegible] med Potaske, 5 med Cupr ammon og 7 med diff % af Carbon [illegible] med Cu ammon.

12/12 99.
[illegible] uden videre notabelt.
Valgte og med Plader med og uden Chloral med [illegible] [illegible], dyppet i ag. [illegible]
[illegible].
Igaar eftermiddag kom E [illegible], og [illegible] [illegible] efter [illegible] [illegible] gik [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] bordet i [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] for hensyns [illegible],
[illegible] han [illegible] [illegible]
[illegible] ikke [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] hele dele [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible]: Tired out! –
[illegible] [illegible] 2 timer.
2 Igaar idag med [illegible] [illegible]
[illegible] at [illegible] [illegible]
[illegible]. Vil spørge Fried angaaende Randolph. E [illegible]
[illegible] sandsynligvis [illegible] om

[illegible] Cr[illegible] [illegible] 15 [illegible]

1) Summerhill plate mat
as [illegible]
(#1) 79) 1475 g
3g [illegible] 4 g
Ac. 4. 5,8. 6.2. 6.2 - 5.8
40 - 63 %

2) (#35 - 9 c)
Blue lake oxyde with
40% Charcoal (between 40 and
100 mesh) - 8.7 g
4.4 - 5.1
75% , 87%

3) #26 15 g
Blue lake mat mesh
[illegible] [illegible] bottle.
48 % , 48 , 52 % 66, 66%

4) #14 10% Charcoal, mesh
Blue lk 9,1 g

5.(33) 15% Charcoal, mesh [illegible]
8.7 g

17/1. 99.

Forholdet i Aar 8 om Pleksæne med Sølvnitrat. Anledningen var lov at gø om Sølv-bad og gøre ønsket forøg på at examinere nig.

Tomelen fra AgNO3 blev præcipitert ved i AgNO3-gjør AgCl(?) og dette og Sølv-gjøde i en tæt et omslag-papir for saadan bestandige pleksæne. Nu det var slunge, de bør fik det saa vaaglig ned i ihu, resultat det var elegant.

Han bør prøvedat 40% Sølv af AgNO3, at undersøgelsen og ønsket opgave, at der er ej plusvirkedit absolutet af en normal pleksæne i hver pæne ca. 0.5 g.

Vægt af hvem pleksæne 15 g i vidtelighedsm 1 ca 15 lo. dem 20 øller tera vanni

fra Kellerup (a lb 17 øre) Kr 2.55

fra Ilum (a 0.5 lb 56 øre) Kr 4.48

Forsøgte derfor min hypotese
ophobningen i blodet af ex
at brænde blodet ved dyp=
ningen. Tak den store dag
12 mgr jeg slap af end af
Soda.
Den fredag chop forsøgte jeg
at fora my behandling for
at ha. lavt opbyggen acba
fra ha ban barge by, mig
skal jeg store, hvor mind
acet ikke nå af denne tog
Her jr Nite behandler hyg=
mygt. Sukker 7/12

Los lanit, saa opinghe So
my Wol sad her vanly
medans jeg aprer alt dette
– ban jeg bande prøvet at
brænde jeg blodet (som regnet)
Jeg god middelet begred om
No 26 (± 41 pg 27)
begne jeg opdagen de
66 p. Nilt jeg ikke idem med
denne min egen. (Kolkode)
Efter lidt sakriels om

processen 20 ban, at
regn er nogen 80% andet end
You're on the right track
now! —
No 26 reier min med den
Absolutesk rekst: 14.7 g
hvef. er 2 g vodske + 13 g
De 6.6 AH gir der: 7.6 %
Kontrolleer min alt, som
er fejlt af.

18/12 99.

19/12

Trouvé

résultats

21/12

Mucks

[illegible] of [illegible]

[illegible] bugle

[illegible] yn det, ac

and nosh

ac close, [illegible] ac [illegible]

[illegible] ac

[illegible] 25 [illegible]

ac

-pulet

yn ei rest, [illegible] bride mi

a det [illegible] – [illegible] you

2 dys. – bowls of pulent

Mor mab [illegible] plenty (= 4?)

mewn 2s 5½ 2s 4½. Dylie ni

talu [illegible] pa [illegible]

39 ct. Dim [illegible] of [illegible]

possible [illegible] the [illegible]

Troulle a [illegible], [illegible] 2s for

bilot [illegible] lewis [illegible] ar

yr [illegible] brandy. Troulle [illegible] ellw

ac stockmen [illegible] yn [illegible]

[illegible] the [illegible] plaidd

[illegible] 2 [illegible] [illegible]

them [illegible], [illegible] plenty [illegible]

[illegible] serion [illegible] yn [illegible]

day.

Ffrois y [illegible] [illegible] fra

success of [illegible] old [illegible]

slyg mewn [illegible] cella, a [illegible]

for 18 dale i 8s each. [illegible]

Tomorrow, rule 3-4 days [illegible] det ac

prepare, because of prison plate

ac of [illegible] [illegible] [illegible]

pen mye rides, son large [illegible] [illegible]

mole pen [illegible], son [illegible] [illegible]

gott [illegible] of [illegible] [illegible] ac of.

Beside [illegible] dim. For [illegible] son

[illegible] newyddion, stone yr [illegible] for

henchmen 2 of rogue [illegible] leg

bl 8 eller [illegible] for [illegible] det a

[illegible] slyg det. [illegible]

3½ [illegible] [illegible] [illegible]

Cu [illegible] lost a [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

yr mewn [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[

Julemorgen var en bad luck
week-dag!
Først de mange uns forstoppelser i begyndelsen, senere
gode aftaler og min opmærksom-
hedsfulde fejlfaldne med Cæsar-
salter, Lilleby, Brandtæg
ved siden af en traadsnedker
et Amperemeter og Bugle.
Nu en dag for at lægge dette
Alligevel var det lille med
to og mange ting er bra
i julen.

28/12 - 09

[illegible]

Lyderen Clonic, Indpakke
Vitrite, Bromide Eureka, Flora
Locket med Agfa og do. med
2½% og 5% Impressionsjern (hvilket
Emma's blev et fast Skelet for
os. Han angav Clay men
de var ikke den for det - det
bruger vi dette Sølvet, hvilket
vil skaffe os lysere bra
Ingait med julepakke min
[illegible] i [illegible] igje de
Hang i [illegible] igje.
Skrev igjen det med Phonograf.
sangen [illegible] aften - [illegible]
først lave det i De jeg.

4/1 — 1905

Dr. Mellem et langt interessant, forøvrigt handlesvagt ude
Fredag var Fogh udnævnt til egen
scale og behandledes med mitude
Liv og mundoplæsninger. Jeg
har gjort det samme med
Gymnasiet. Efter optoget i KK
bordet var der igen lang mø
og forfærdelig meget det
samme bordet efter var det,
det brødte i guldbryllupsnatten
En dårlig begyndelse på et år
tak!

Vilde Gina præsent:
Plads af Kobber, meget tyndt behan
det på en side med Æbler,
klyngejet i smaadrykke af
petitet i Brød. Ellers gik min der
ud alle ventetider, dyrlede
mere Gymnasiet end Bingt.
Paa egen revisor priser i dag
forøvrigt at opgive pladsbestemmelse
i nødhede.
G. tog med universe mest mit

Søndag var at komme den
hele andelen. Cuseele
Bad ude noor jeg gaar Cøbel
for at slaa E. jo. [illegible] penge
Solen laagt jo [illegible] blæse
[illegible] meget om aftenen,
[illegible] og blander
School gik [illegible] i det hele
[illegible] ned at [illegible] [illegible]
og [illegible] alt, [illegible] [illegible]
[illegible] og [illegible] [illegible]

10/1 00.
I jo. rent kommen ud
af det det at skrive i
dette [illegible]. Well start posse-
ren der jo [illegible] [illegible]
Idag efter (71) vilde jeg
gaa til E. men [illegible] [illegible]
[illegible] E. og [illegible] om
at [illegible] [illegible] [illegible]
i Hadelsom. Det [illegible]
jo alt [illegible] i begyndelsen
men [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
Efter aftens the [illegible], [illegible]
[illegible] [illegible] [illegible] [illegible]

dejlig hyggelig – hjelpsom
form. Faust's Nord Polar
artikkel – min om jeldfiske
og dertil der alt andet
trykte artikkel om mig
Efterfølgende to Aften – Man dø
der, hvad – lade os gå det
Chemiske eksperimenter,
med Svanderne, samt fra
krystallerne. Onsdag det.
Aften – indbeliebt god Nigh-
land dammen – dejligt vær
og ora os, alone skjøtte af
White hand gamsho hygge
for os. Onsdag, efter at
have haft det godt resultater
for os det – ikke i perle-
fiskeri som af mig fortælles
begynder af spinde bort af
Gæst og med jeg
hvor jeg 2 917 for vejen
Ad. Gothenburg: Melbo 1913
Jeg ser Experimenter over
Salmedelighed mig oplæst
men han skrev de tænk
for det. Jeg er det mig
dejlig og mange sypandt

Jeg ønsker 15 August, min ønske
gjøre mig gifte, gratter (!)
Noske god det godte
gjøre skrøpelig Albertsen os
resultaterne overraskelig for.
– – –

Thursday afternoon 22/12
Emily.
5/6

9/2 00

[illegible]

(I mean my overall)

[47]

I Uppsamlingen [illegible] er fort-
sat i samme spor – for-
såvidt skala – [illegible] en fort
i forskj. [illegible]
såvidt på en side; samme
skytte lange stunder [illegible]
[illegible] i grid etc. – [illegible]
[illegible]
[illegible] – sind-
rig [illegible]
[illegible]
kvarteret – [illegible]
[illegible]
[illegible] falde af med et skytte
[illegible]
[illegible]
[illegible] Cu. De bedste skala's
gav 78% og synes halve synbar
De har paa 15g Cu 0.25 g $AgNO_3$
omvendes til $AgCy$ —
Den nyeste forsøgte er brunst
saaledes: Cu scale forsølves – om
ca 16-18 mesh blik i dette screen med
en tvær børste bukket noh til
at falde igjennem – presset
igjennem og dernæst stod
ridt fra første gang 56%

Da 0.25 A synes for høit for
den sidste del af oxydationen
lod jeg pladerne oxydere længe
og [illegible] lod [illegible] for reduc. –
Det viste sig at den sidste 1/4 %
foregaar efter at dellen har begyndt
at gi gas. Endel var for-
vælt mer 80 %. Hoos [illegible]
[illegible] mig [illegible] bunde-
falvet. ——
Af [illegible] [illegible]
[illegible] [illegible] [illegible]
selskab af [illegible] [illegible]
af hvilke [illegible] [illegible]
te mig [illegible] [illegible]
[illegible] [illegible] [illegible]
geburtsdags selskab hos Anna
[illegible] [illegible] [illegible] mig om
jeg [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] Reiste med [illegible]
og fotograferede [illegible] grav.
[illegible] [illegible] [illegible] [illegible]
pigebørnene, Rasmus og [illegible]
[illegible] i Parken [illegible] og [illegible]

til kaffe hos W. hvor [illegible]
og [illegible] Thomassen, [illegible]
og [illegible] [illegible].
[illegible]
skulde vist [illegible]
for [illegible]
[illegible]
i de [illegible] 14 dage [illegible]
[illegible] over [illegible]
dalen – ikke [illegible]
[illegible]
for [illegible]
[illegible] og [illegible] det [illegible]
[illegible]
[illegible]
[illegible] i Norge – [illegible]
[illegible]
[illegible]
[illegible] om en 50e [illegible]
[illegible]
[illegible] sagt: Du [illegible]
[illegible] det [illegible].
Nu er kortet færdig og ser
sig ikke saa [illegible].
Ericsen [illegible] (2de)
til [illegible] sin [illegible]
begravelse. – [illegible] sig og –

[illegible] [illegible]
[illegible] [illegible]

21/2 '00 [illegible] 9.30

Sunset early. [illegible]
large [illegible]; [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
large.
Schmidt inlet mgt
No. 77 bar gt 80, 79 – 81 – 80 %
(.500 g AgNO3, [illegible])
Dun [illegible] [illegible] [illegible]
[illegible] g. KNO3 (.109) [illegible] 76 – 76.2
Ellers [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
Astronomi.
Var [illegible] i [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
Phillips, [illegible] [illegible]
[illegible] [illegible] [illegible]

Mus, de jo daar effens met
Tuesday OH. of Voze na oggie
i Kwisel, saa 9 ora vanaf
Kolenne de, zyndo at Helpston
Stille Ham saa jaar kwam
mit du opraa was all right
En hindt nye oggen fik jo
oggen – af hvilke flere sa
lett mistenkte var.
(Wolfe).
Blog Ferrit plader (ad 6 H)
med CuO_2 af NH_3O.
Solution blev ellerne
77 – 78 – 99 – 103 – 109 – 164
(Perlag) – git fisk Soda og
hvad hun 0.020 g Aluminium
den skal gave det opløste $Cu(OH)_2$
Da jo dog saa med med
Helpston måtte jo Malory
den først opløgte dyr, om
jo arbejdede om efter.
Om det var misforstandt
om det den kunde gøre nat
for middag(?) vedk ikke
kommer ned at se mig
jo med, hvad jo har at gøre.

Fredag 16/3 00 besøg af Thune, Larsen og Rolusen. Søndag 18de med Ballantine i Edisonds.

— Torsdag 22/3 00.

Den mandag efter vi gandske kort igjen — efter 8½ ugs forløb, i hvilket tidsrum jeg kun skriver mig selv. Efter jeg var oppe i huset var jeg sidst med de ejegrave, jeg med den anledning fik.

Malmøys angreb ½ dispatte mig lidt. — uregelmæssigt resultat. I et de sidste indmyre mig lidt berøre og lefa for mig. Stor priim for lejre at rense. Pierre af gd ejgrave tø mig hende, alt hvad en jø jø forstøje den. Mandag kan man fex vente at MnO₂ efter brænding skal gi nogen ndre reduksjon end at PbO₂ brændt til PbO skal gi mere O pr ugtinkt end CuO.

[5-3]

Bismuth er ofte en oplæsning i pulverform, Bi-oxydhydrat er hyppigst alene, men ikke sjelden ledsaget af en oxydhydrat af forbindelser af Bi og af Bi-salte med syrerester af Bi-hydrat og gir Bi-O. Skumfyldt og producerer ny ikke forbrænde og gir en hvidt uplettelig ~~men~~ oxydation

Tarmsekret gir ikke de forandrede resultater – Plasma-proteiner besidder lige godt med bibeholdelse.

Hos albuer grænser lidet at vise fem – 0 til 0 ~~vente~~ ny sorlig blive mindre – om

B. jo ud over ~~[illegible]~~ ~~[illegible]~~ B. Brochan. Dra undersøgelse på søndag ~~[illegible]~~ Brochlyn hvor B. ikke bor nært ~~[illegible]~~ paa B. lyn.

[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

Steinmetz's way of verifying the complex magnetic [illegible] the spiral curves. — ETB 8.93

12 (L. Alt curr)

Proposition e^{-x} (Lilly)

$\cos\beta = \cos\alpha \cos\gamma + \sin\alpha \sin\gamma \cos\delta$ (90°) (Lilly 2)

$\frac{1}{\sqrt{1+\cot^2}} = 1 - \cot^2$???

Normal ← Tang. of the Ellipse (Lilly)

Patterns of curvature Lilly² Rolf

Differentiability range.
with gymnast.

Undilatorische Theorie (carl Ing)
Darwins Origin of the species
The nervous system (Anderson)

30 Oct 1900

Weight of Cd pole (Frame)
Plane surfaces, not pocket
pocket chart.
Cd before packing cleaned
w. weak HCl
Weight 190 − 36.4
= 153.6 with Cd

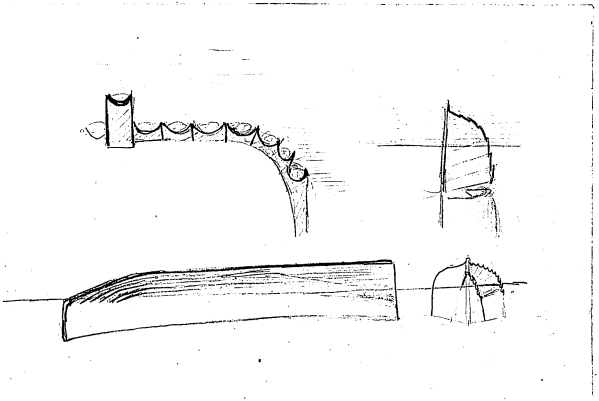
[ITEM FOUND IN BOOK]

Thos Graham
Seattle
Wash

Butler Hotel

Brunswick Hotel

[ITEM FOUND IN BOOK]



Notebook, N-99-12-15

Galvanic Cells. (Storage)

= 9.5

Dec 15 - 1899.

Plates treated with
$AgNO_3$ Solution

39 Weight 14.65g
" Cu_2O (tile lake) stuck with
soda baked,
Absorbed 1.3g $AgNO_3$ sol 5%
and washed.
4.5, 3.5 - 3.8 - 2.5 -

40 Weight 13.3g
Lib 1a. with Soda
Absorbed 1.25g 10% Sol. $AgNO_3$ &
washed
3.8 - 2.4 - 2.9 - 2.5 - 2.4 -
4.26

41 W = 14.15 g
Silver lake plate with soda
Abs 1.3 g Sol $AgNO_3$ 20% aqueous
4.0 - 3.5 - 3.5 - 2.2 - 2.8

42 W = 14.02
Silver lake w. soda
Abs 1.25 g Sol $AgNO_3$ 30% aqueous
3.5 - 3.5 - 3.2 - 2.8

#43 W = 14.7 g
Silv lk w soda
Soaked in 5% Sol $AgNO_3$ and
baked. Amount of Ag unknown
on reason of the chem reaction
4.0 - 3.7 - 3.5 - 3.5

#44 W = 13.1 g
Silv lk w soda
Soaked in 10% Sol $AgNO_3$ and
baked —
3.80 - 3.4 - 2.2 - 2.2 - 2.4
4.0

#45 W = 13.65 g
Silv lk w. soda
Soaked in 20% Sol & baked.
4.0 - 3.5 - 2.8 - 2.0

Amount of Ag = $\frac{107}{164} \cdot 1.25 = 0.05$
= 0.0389g
for 15 lbs CuO : 062 oz
Price = ~$.035

Price of silver for 15 lb CuO
$\frac{16}{10} \cdot 0.123 \cdot .056 = \$1.10$

#46 W = 13.9g
Sil lb. w Pora
Absorber 1.25 g 5% Sol $AgNO_3$
and baker
31 - 2.9 - 2.2 - 2.5 - 3.2 - 2.5
33.2%

#47 W = 11.52
Ab. 1.00 g 20% Sol $AgNO_3$
and baker
31 - 2.2 - 2.9 - 3.2 - 2.5
39.2%

#48 Silv lb. stuck w Pora
W = 13.00 2g Sol $AgNO_3$ 5% absorber
5.8 - 4.4 - 3.0 - 3.2 -

~~#50 w = 13.76 g~~
~~Solid [illegible] which [illegible] KOH~~
~~Dissolved [illegible] dipped [illegible]~~
~~$AgNO_3$ [illegible] [illegible]~~
~~[illegible] $AgNO_3$~~

~~#49~~ w = 13.42
Solid [illegible] which [illegible]
[illegible], washed on
by $AgNO_3$ when reduced.
3.2 - 5.0 - 3.9 - 4.0 - 2.0

#52 13.42 Dissolve with 2.5 %
NH_4Cl, 2g $AgNO_3$ Sol. 50%
washed
3.7 - 3.2 - 3.0 - 2.0 - 3.2 - 5.0

52 13.3 g
Dilute lk with $Cu(C_4H_3O_2)$
1.7 g Sol $AgNO_3$ 50% & washed
4.5 - 3.6 - 3.9 - 3.2

53 14.35 g
Dilute lk with $CuFl_2O_7$
1.7 g Sol $AgNO_3$ 50% & washed
4.8 - 5.5 - 7.4 - 3.0 - 2.6

54 12.1 g
Dilute lk with $Cu(CN)_2$
1.8 g Sol $AgNO_3$ 50%
3.0 - 4.9 - 3.2 - 2.7 - 2.6

#55 13.75
Silver lk with $CuCl_2$
2g Sol $AgNO_3$ 50%
41-47-37-30-32

#56 11.20
Silver lk with $CuBr_2$
.5 Sol $AgNO_3$ 50%
40-49-34-35-29

#57 13.65g
Silver lk with 5% Psol UnidA
25 $AgNO_3$ (50%)
41-49-34-34-30

*) Cell charged 2-3 amp. Hour after the loss of growing power time for reducing taken

58 12.95 g
Silv lk with 10% Bolle Mixt A
2 g $AgNO_3$ (50%)
6.5 - 6.0 - 4.5 - 5.8 - 5.0 4.5 - 4.7
*) 4.1, 4.2, 5.1 5.6 4.9

59 14.35 g
Silv lk with 5% Bolle Mixt
2 g Sol-$AgNO_3$ 50%
3.5 - 4.1 3.2 - 3.6

#60 Silv. lk Locher with Cinacetat
14.55 g 1.3 g $AgNO_3$ (50% Sol)
5.0 - 5.2 - 5.5 - 4.8 - 4.9 5.0 - 8.9
*) 3.7 - 3.2 - 3.5 - 4.6 5.1

#61 14.65g
Filtrate boiled with Cu chloride
2.0g 50% Sol $AgNO_3$
5.2 - 5.8 - 6.8 - 5.8
6.5 - 6.3 - 5.9 - 5.7

#62 14.15g
Filtrate with Cu_2O_x
1.3g 50% Sol $AgNO_3$
5.7 - 6.0 - 5.2 - 6.1 - 5.3 -
5.0 - 4.2 - 5.1 4.6 - 4.9

#63 14.50
Filtrate with Cu Nitrate
1.3g 50% Sol $AgNO_3$
6.5 - 6.0 - 6.4 - 5.9 - 5.2
5.2 - 5.2 - 5.9 - 5.5 - 4.6

#64 12.5

Silver lk with 50% Infusorium
1.7g 50% Sol $Co(NO_3)_2$
4.1 - 3.9 - 4.0 - 3.2 - 3.1 - 3.6

#85 15.1g

Silver plinch with
2.0g 50% Sol $AgNO_3$
4.2 - 3.2 - 2.8 - 3.1 - 2.0 - 4.1

#66 9.45g

Silver plinch with diluted
HNO_3 (approximately a 50% Sol of
the concentrated HNO_3) after boiling
washed in soda and water.
2g + 50% Sol $AgNO_3$ and water
4.3 - 3.2 - 3.2 - 4.0 - 3.7 - 4.0 - 4.1

More readily dissolved in soda than most plates.
*) see remark on page 8.

#67
Reitmeier Copper sensible (.16 g wet) acted on by Br_2 for Ag NO$_3$. This gave black blue on the scale (ca 11,5) on grid.
4.0 4.5 – 4.5 – 4.0 – 3.8 – 4.0 – 4.0
4.2 – 4.5 4.2 – 4.0 – 4.7
*) 4.9 – 4.2 –

#68 Reitmeier Cirscale acted on by Ag CN dissolved in KCN. ca 11g
2.3 2.8 – 3.2 – 4.1 – 3.4 – 3.4
– 3.1 – 3.2 2.9
*) 3.9 – 3.2 – 2.5 – 2.5 – 3.0

#69 Pf Reitmeier Cirscale 95 %
treated in
#68 5% (ca 11g
2.5 – 2.2 – 1.2 – 2.1 – 2.0 –

#70 ca 10.5g
90% plain reduced scale
10% silver coated scale
4.4 - 3.2 - 1.7 - 1.3

#71 ca 10g
20% silvercoated scale
3.6 - 4.7 - 3.9 - 4.5

#72 ca 11.5g
35% silvercoated 65% plain circle
3.2 - 3.2 - 3.5

#73 ca 12g
50% silvered, 50% plain.
Liscale
2.4 3.0 - 3.2 - 3.0

#74 [illegible]
[illegible] 32.0g
3.74 - - - - - - - 0.5-0.2

15
10½ —

#75 - Regular pellet - 13g
[illegible]
132
all to pieces

12
11
12
13
13

Price per lb 53.4 ch.
*see remark on pg 8.
This method like all others containing scale of copper colours the soda blue, especially during first oxidation and when "overoxidizing" (4.5)

#76 15.8 x 3 = 6.53 g

15 Copperscale 50 mg Cu_2NO_3
2.6 - 2.6 - 2.9 - 3.0 - 3.1 - 2.5 - 2.9
47% 47% -
2.9 - 2.9 - 2.2 - fresh soda - 2.3
*) 3.7 - 2.1 - 2.4 - 2.6 - 2.7
(71%)

#77 15 g Copperscale 100 mg Cu_2NO_3
w = 5.3 g
2.5 - 2.7 - 2.5 - 3.0 - 2.4 - 2.4 - 2.4
57%
fresh soda 2.0
*) 2.3 - 3.4 - 2.1 - 3.4 - 3.5 - 3.8 - 3.0
- 3.0 (or 3.2) - 3.2 (+1.8) 1.0 (79%)

#78 8.85 g
Ag Copperscale a 500 mg Cu_2NO_3 washed after precipit.
2.9 - 4.5 - 4.6 - 4.6 - 4.7 - 4.8 - 5.0
fresh soda 5.1
*) 5.0 - 5.1 - 4.8 - 4.8 - 5.5 - 5.5 - 5.6
5.5 - 5.6 - 5.7 - 5.7 5.1 - 5.0
82%
(or 4.5) 5.0 . 45

Best qual

#79 (= 7.2.)
1 kg Commercial covered with
0.100 g AgCl. crushed.
2.6 - 2.8 - 3.0 - 3.0 - 3.5 - 3.8 - 3.0
fresh Soda - " 3.5 - 2.9 - 2.9 - 3.9 - 3.2 - 3.4
15%

#80 4.7
(Electrolytic) in 2/1000 Copper foil
on one side covered w. silver
- Cut in small pieces - in grid
.05 =
5 first times below 1.
0.6 - 0.8 - 0.8 - 1.0 - 1.2 - 1.3 - 1.0
38%

#87 3.25
1/1000 Copper foil rubbed on one
side w. AgCl. Small pieces
in grid.
.07 - 5 times below 1.0
0.4 - 0.4 - 0.7 -

#83 6.55 g
2½/1000 Copper foil (Electrotyp)
8 times below 1.0 - 0.4 - 0.4 - 0.4 -

#85 Plate at [illegible]
[illegible] with [illegible] 17.7 g
3.0 - 3.1 - 2.9 - 3.3 - 3.6 - 5.4
3.7 - 2.0 - 3.1 - 3.1 2.0) 4.5 - 3.5

#84 (Plate made 10%
[illegible]
[illegible] 14.6 g
4.8 - 5.8 - 5.8 - 4.2 - 4.0 - 6.8 -
4.2 - 4.0) 6.8 - 6.4 - 6.5

#. 85 14.19
Plate stuck with Fluoride
of Copper 2g Wilh. powder
5.4 - 5.8 - 6.6 - 4.0 - 6.6 - 5.6 - 4.0
⊙ 6.6 - 5.6 - 6.0 — —

#. 86 14.39
Plate stuck with Fluoride
of Copper absorbent 2g Wilh.
5.4 5.8 - 5.2 - 5.8 5.4 -
⊙ 5.1 - 5.1

#. 87 6.9
2.5 [illegible] Copper powder
on one side [illegible] small pieces and exposed at
red light
2.1 - 3.0 - 2.8 - 3.5 - 3.1 - 3.4 -
(61%)
4.0 - 3.2 - 3.4 - 2.8 fast Sora
⊙ 4.0 - 3.2 - 3.7 - 3.4 - 2.5 - 3.2 - 2.4

x) See remarks on pag 85.

#88 Pike [illegible]
[illegible] a
caught, [illegible] Alabama
[illegible]
4.0 - 3.8 - 4.2 - 4.0 - 3.1 - 2.5 3.7
3.3 - 3.2 - 3.9 4.2 - 4.0 - 3.5

#89 Pike 13.5
Bill like [illegible] caught
[illegible] Florida [illegible]
[illegible]
4.2 - 4.5 - 3.4 - 3.5 - 4.6 - 3.7

#90 Pike 14.3
Bought on [illegible] Florida
and [illegible] and released
4.0 - 3.5 - 3.1 - 3.5 - 3.2 - 3.1 - 3.1
4.5 - 3.5 3.9 4.2 - 3.4 - 4.2 - 4.1

#91 3.3 g
1/100 [illegible]
in organic [illegible]
0.0 - 0.4 - 0.3 - 0.3

#92 14.5
Pale stuck with soda
(#43) [illegible] and [illegible]
at [illegible] 2g [illegible]
29 - 50 - 48 - 48 - 5.8 - 5.2 - 5.1
45 -

#93
Pale stuck w [illegible]
[illegible] 1.5 g Ag [illegible]
in [illegible] 0.05 g Ag.
and [illegible]
44 - 40 - 39 - 28 - 2.9 - 3.1

#94 1407
Plate with Cinsalt
2.1 g of Sol. AgCl in KCn, 13.5 g
of which contains 2 g AgNO3
(.85 g Silver)
included
2.5 - 2.3 - 3.7 - 3.2 - 4.2 - 2.4 - 2.8
3.5 - 4.0. 3.7 - 3.3 -

#95 14.15
Plate with Cinsalt.
Absorbed AgCl containing
.18 g Ag. and related
3.60 3.5 - 3.4 - 3.2 - 8.2 - 4.5 - 4.0 - 4.5
4.7 - 6.3 6.2 - 6.0

#96 Not reduced Cinsalt: treated
with AgNO3: amount of Ag
unknown (very high)
3.1 - 3.0 - 2.0 3.3 - 3.0 1.8 - 2.2 - 3.2 2.1
8.0 - 3.3 - 2.1

Price per lbs 25.1 ch

*) charged 2-3 tumbrouses after begin of gassing and time for reducing taken.

32.2 ch

21.5 ch

#97 6.05 g
Reducer on scale 15 g
$AgNO_3$ in sol 0.100 g
crushed when dried
2.4 - 2.6 - 2.9 - 2.2 - 3.1, 3.4 - 3.2
fresh soda *) 2.4 - 3.7 - 2.4 - 3.4 - 3.5
1.5 - 2.1 (74%)

#98 6.2 g
Reducer scale 15 g
$AgNO_3$ — Cyanide sol 0.100 g
broken up
2.6 - 3.4 - 3.5 - 3.6 - 3.7 - 3.7
fresh soda *) 3.7 - 3.4 - 3.7 3.7 3.7 3.0
2.9 - (1.2 ch) - 2.3 (rel 16) (72%)

#99 6.95 g
Reducer scale
$AgNO_3$ in Cyanide sol: 0.050 g
dried and broken up
3.0 - 3.2 - 3.1 2.9 - 3.0 *) 3.5 - 4.5 -
3.5 - 4.1 - 4.0 - 3.8 - -

#100 6.5 g
Very [illegible] [illegible] exp. [illegible] (Crush
massive mass) [illegible]
0.5 – 0.9 – 0.8 – 0.7 – 1.1 – 1.1 – 1.0

#107 8.75 g
[illegible] [illegible] [illegible]
[illegible] very [illegible] [illegible] [illegible]
1/2" stages [illegible]
0.5 – 0.9 – 0.8 – 1.0 – 1.1 – 1.0 – 1.1

#102 3.0 g (before exp.
Crush as [illegible] silver
packet make grid and assaying
for red lead.
1.2 – 1.3 – 1.4 – 1.7 – 1.5

32 cts per lb.

#103 4.5

Chicken meat [illegible] on the surface and [illegible] in gas.

1.4 - 1.4 - 2.5 - 2.6 - 2.2 - 1.3 - 1.7

67%

#104 9.5g

15g [illegible] acetate 0.2g AgNO3 on the [illegible] position. [illegible] after [illegible] broken [illegible] and brown [illegible].

4.3 - 4.8 - 5.5 - 4.2 - 5.2 - 5.1 - 5.3 - 5.3

5.2 (av 4.1) 4.6 - 4.4 (av 4.0) 4.1 - 4.2

4.7

#105 as 104 8.95g

stopped hard

3.5 - 2.4 - 5.1 - 4.0 - 4.5 - 5.8

4.7 4.1

5.1 - 5.0 (4.2 av) 4.4 (4.1) 4.2 4.2

#106 Co. 104 & 105 6:8

Stopped loosely

2.6 - 3.3 - 2.9 - 2.6 - 2.8 - 3.1 -

(6x 1.2) - 3.1 - 3.0 2.3 - 1.4 -

#108 6.9

1.3 calc, 0.15 g $Cu(NO_3)_2$ concentr. nitric. Bromide

Scale broken through scale

3.5 - 4.0 - 4.0 - 4.0 - 4.0 - 4.0 - (0x 3.4)

69%

3.5 - 3.5 - 3.9 3.5 3.1

#107 6.5

Co. 103 - Scale cleaned in HNO_3

4.1 - 4.1 - 4.2 - 4.2 (6x 3.0)

78%

3.1 - 3.0

3.4 - 3.5 - 3.3

#1004 12.8
Plate: 75% CuO 25% NiO
Stuck with soda lime [illegible]
[illegible] on a [illegible] rod
Freezing in Liquid Ammonia
as Primary [illegible] only
14.45 AH

#111 14.55
75% CuO 25% PbO
on 110

#112 14.85
on 110
Only 1/2 amp. b. of Resistance
~ Resistance ~~7.2 amp~~
o. 7.8 AH

#113 as #111 12.2

Only for Sample of Particular Reduction 55% 68%

= 75% × 0.91

#114 9.45 g
Mother liquor evaporated to dryness about 1/22" in grid
3.0 (of 3.0) rubbed) - 3.1 - 3.0
(2.0) 3.8 (2.1) 2.8 2.8 - 3.0 —

#115 5.3
15% Cu(ii) acetate 0.25 g Ag(i) NO3
converts to cyanide
In the grid is a
mesh of enamelled Copper
wire (1/400 x 15/100) mounted
on a hard copper wire
3.1 - 3.1 - 3.0 3.1 = 66%
Of 2.8. Burnt 2.0 Ref 3.0
(2.9) 3.0 2.8 - 3.0

#116 6.17

15 g Cu sc.ale 0.15 g O_2 NO_3
broken Chromic acid
poached on gold with a
continuous silver copper
anode

~3.7 - (2.80 open) - 3.4 - 3.5 - (2.7)
67% 61% 63%
- 3.4 (2.8 m) 3.1 3.2 - 3.0

#117 4.85

Bromulli Hydrocarbi poached
with damp.

0.8 - (0.60 x) - 0.8 - 0.5

#125

#118 8.4%
Melted copper oxide of ore [illegible]
reduced by current
silvered in cyanide [illegible]
then broken up, screened on 100
and powdered in pot with silver
red copper wire
3.7 – (3.8 ox) 3.4 – (2.1)
(2.9) 3.0 2.6 – 2.5 3.0 —

#119 9.0
as 118, not broken up after
blending
2.7 3.1 – 3.0
41.5%
(3.1) – 3.2 2.9 – 3.0

Grids with melted oxide
colour liquid dark blue,

30

120 20.53 melter Bi_2O_3

In trying to which figure ~~Bi(OH)~~ can be reduced.

~~0.9 AH~~ ~~2.7 AH~~

~~0.9 AH~~ ~~0.27 O~~

~~3.1 - 3.0 - 4.0~~ N.G.

First observation wrong.

121 11.10 g melter Bi_2O_3

for reducing.

3.75

122 3.25 $Bi(OH)_3$

for reducing. 3.25 for

7.35 1.05 AH

#123 13.92g Plate 31

75% CuO 25% MnO_2

Stuck with Potash, and dried in oven (below 250°C)

Put into cell with Zinc.

(Falls to pieces.)

13.92

after burning 13.62

13.92 . 025 = 3.48

MnO_2 = 55 + 32 = 87

87 : 13.48 = 16 : x

$x = \frac{13.48 \cdot 32}{87} = 0.64g.$

One Atom of O corresponds to the weight 0.64g.

Continued as # 132 w = 13.62

65 AH

#124 16.2 g Plate

25% Ag_2O, 75% CuO only dried

Put into complete cell

Falls to pieces!

#133 13.15 g

25% MnO_2, 50% CuO.

baked

Complete cell

Volts: 1.100 pH: 6.5

#125 13.12 g. Plate
25% MnO, 75% CuO
Dried in oven, 1 Soda
Falls to pieces

#126 18.7 g Plate
25% PbO, 75% BiO*
Dried, (Soda)
Falls to pieces

#127 3.55 g
Pt (OH) Am Sand
~~0.08 · 0.377~~ 0.8 - 0.7
*

#128 5.65g

Silver in scale (0.05g W 15g)
broken and packed in grid with silver/copper wire. Final ox: 2:1
Rev. 30 = 64%
(Ox 2:1) Rev 30
2.8 - 2.9 - 2.6 - 2.7 - (2.8) - 2.6 - 2.7

#129 Silver copper scale (0.05:15)
Broken with silver copper wire W = 6.4g (- wire)
4.0 - 3.1 (0x 38) (3.1) 3.4
75%
(3.0) - 3.9

#130 W = 6.05 (- wire)
Silver scale (0.5:15)
broken and packed in grid with silver wire
3.5 (6.3-0) - 3.4 4.0

Weight of Bismuth - depos.
corresp. for Amp. Hour current
1) In case of reduction from
Bi_2O_3 to Bi_2O_2:
8.7g

2) From Bi_2O_3 to Bi_2:
4.35g

The same for Copper
per Amp. Hour 1.5 Amp. Hour

The ratio of spec. grav.
$CuO \cdot Bi_2O_3 = 6.4 : 8.3$

The data for the determination of the voltage from the heats of formation can not be obtained for Bi_2O_2, Bi_2O_3 - only for $Bi_2(OH)_3$. But in this case so pronounly not able to follow the

process.

The cell gases after the developing of 3 H at the Bismuth pole, and still the product seems to be Bi_2O_2 (black, heavy, crystalline)

By heating the product to red heat, it gives about half of Bi and half of yellow Bi_2O_3.

Does this oxydize an expense of the lower oxide, reducing till later to Bi_2?

#131 .7g

Copper sole, silvered (0.5:15).

Bottom in series and washed with silver wire, the end of which is soldered to the grid.

4.0 - 3.6 - 3.9

68% 62% - 67%

(3.1) 3.5 - 3.6

On the precipitating of the Sodium cupratate by means of Allen Tannate.

According to the presence of organic matter hinders the dissolving of the $Cu(HO)_2$.

By mixing the cupratate soda with the Tannate, the color at first disappears; after a short while it turns light blue again.

#135

When CuO of plate is reduced, the lead is deposited on the copper-pole and spongy state.

#134 Plate 16.8 g
75% PbO_2 75% CuO
stuck with Soda and baked

#135 Plate 15.55 g
25% PbO_2 75% CuO stuck
with Soda and baked
complete cell.

#136 7.95g

Copperscale, silver (in prop. 15:0.25) broken through screen and leached in grid with ca 12 pieces of silver wire, all of which have end soldered to the grid.

(0.8g wire)

Ox. 4.3 = 85% (Ra)

Ref 5.2 = 79%

(See Ox 4.3) Ref.: 7.8

(0+4.3) 4.7 (4.0) 8.5 %

4.3 7.7 %

Used for plating exp.

2/3 '05

The Tannate of Aluminum does not seem to prevent the aging into salts of the carbohydrate. Following salts tried:

Tin arsenate	Nickel tartrate
" phosphate	citrate
Ammonium chromate	" & Cobalt sulphate
Ammonia "	" Ammonium tartrate
Tin Ammonium chloride	" " sulphate
" Sodium "	benzoate
Bismuth sulphide	
" iodide	
" oxalate	
tannate	
tartrate	

Magnesium nitrate
bromate
chromate
phosphate
phosphite
pyro phosphate
ethyl sulphate
formate
sulphite cyanide
Magnesium & ammonium
phosphate
chloride
arsenate
sulphate

Strontium bromide
arsenite
tartrate
formate
hypo sulphate
Ditto "

Bismuth formate
" citrate

Zinc arsenate	Lead carbolate
" lactate	" malate
" ferro-cyanide	" cyanide
" tannate	" citrate
" valeriate	" antimonate
" oxalate	" butyrate
" chlorate	" ethylsulphate
" silico-fluoride	" tungstate
" chloro-iodide	" acetotartrate
" hypophosphate	" phosphate
" iodate	" sulpho-naphtolate
" citrate	" pyrophosphate
" arsenite	" salicylate
" salicylate	" benzoate
" phosphide	" sulpho-cyanide
" phenate	
" tannate	
" phosphite	
" chromate	
" sulphite	
" picro nitric	
" benzoate	
" ethylsulphate	
" dimaphthate	
" formate	
" sulpho carbolate	

Zinc chlor. cobalt
Zinc. amm. chloride
sulphate
" & calcium cyanide

Exp. experiments on the action of the Aluminium Tannate.

78, 98, 104, 105, 108, 109, 125.
At start of oxidizing dissolve in the 200 different amounts of the Tannate:
0.020 g Tannate, cell becomes green at the time of beginning of gassing.

0.030 - 0.050 g keeps the cell yellowish brown for some hours after gassing begins

0.020 . 0.100 - 0.120 does not show much difference from 0.050, but does not prevent the copper oxide from going into solution and being deposited on the platinum pole

#137 3.17
$Bi(OH)_3$ in grid
1 AH corresp to 3.4 H.
OA 1.8 MA

137 8.67 Plate (1.1)
75% CuO 25% MnO_2
baked to dull red
~~4.5~~ AH (8.67 glass [illegible] gave 5.8 AH)

137 9.75 Plate (1.1)
75% CuO 25% PbO_2
baked bright red, till it turned
grey 4.9 AH. (7.75 Cus: 6.155)
4.9

MnO. or MnO dissolves in the liquid, especially when oxidizing

#140 6.32 grid

Silvered scale (0.45) with 12 doubled cu-wire hairs ends are selected for the grid.

(310/2) Ginstox: 49.5% Ref: 66.4% (35)

(2.6) 3.0 (30) 3.0 (28) 3.0 (28) 3.2

#141 Plate: 13,1

75% CuO, 25% MnO2: baked at red heat — may be oxidized before reducing.

6.35 AH corresponding to 92% of theoretical reduction of the CuO alone. consequently MnO can not be much reoxidized

Dissolves partially

142 Grid. Weight of silver scale: 6.00 g., of wire 0.40 g. 0.40 Scale silver 15:85 brother and pocher worth 20 wires, which are soldered to grid.

(0×3.2) 3.7 (3.3) 3.8 (3.8) 3.4

(3.5) 3.8 (77%) 80%

143 Weight of silver scale: 6.00 Silver in proportion 15:0.3, brother and pocher worth 0.80 g of silver wire (15 pieces), soldered to grid. —

(3.3) 4.0 (3.3) 4.0 (3.3) 4.3
66% 80% (66%) 80% (66)

#144 6.35

Through 40 mesh,

silvered scale 0.3.15.

0.55 g silvered wire (20 doubled)

(2.6) 3.1 (3.0) 3.4 (3.3) 3.9 (3.3) 3.6

Max. Reduction 73 %

" Oxidation 64 %

To try the influence of the size of scale! (silvered 0.3.15)

#145 between 18 & 20 mesh.

Weight: 4.92 g. 25 folds wire 0.55 g

(3x2.6) Red 3.2 (2.8) 3.0 (2.9) 2.5

Max Red. 78 %

" Ox 70 % (?)

#146 Weight 5.33
Between 20 & 40 mesh
25 pelw wne 0.57g
(Ox 2.9) Red 3.2 (2.9) 3.1 (3.1) 3.3
(2.7) 3.2

Max Red 75%
" Ox 70% (?)

#147 Weight 6.86
Between 40 & 100 mesh
25 pelw. wne 0.62g
Ox (3.5) Red 4.0 (3.6) 4.4 (3.7) 4.5

Max Red 80%
" Ox 65%

#148 5.68g
Silver 0.5:15 Size 20 to 40 mesh
0.5g Wne 25 double & solder
(Ox 3.0) Red 4.8 (3.2) 4.5 (3.1) 3.3

Max Red 80%
" Ox 66%

#149 6.00

Silver scale (0.5 to 1.5 g)
pocket with women, silver
copper ribbon, 3 layers, 0.3 g
solvent HNO3 grid.
(0.30) 0.30 (2 hr) 30

Rev 60%
Obv 60%

#150

Platinum crucible formed during
the oxidation in disposition
on the copper foil during
the reducing and thus possibly
covers the silver. This coating
will oxidize before the scales
and insulate these.
To prevent this the solution
after each oxidation is filtered
through powdered Zinc in 80%
pestle. The Zn precipitates
the Cu and forms the compo
zinksalt

#151

Two bundles of silver copper wire as used in all previous cells. Gave silver by dipping in strong cyanide bath & one 2) silvered by current in a weak cyanide silver sol. - used as poles in a weak soda sol. Current 0.20 Amp. 10 min. after start - the first bundle being the oxygen pole - the sol colors blue. The silver has been penetrated. The other bundle (electroplated) holds a little longer, a rough probably on account of thicker layer of silver.

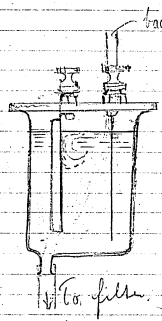
#152

Scale silver in cyanide (used 0.30 Ag/0.3 gms 15 g Cu.) put into cell on a nickel disk.

At the first oxidation the "overoxidation" is avoided after reducing, the silver

coating seems almost unchanged. After second oxidation, an oxidation of ½ hour is allowed; now silver, the scale has lost almost every trace of silver

#153 6.9
Scale, nickel plated by current (in Bunsen sulphate of Nickel & Ammy)
The plating probably rather thick.
Plated on grid with nickel plated copper (1.3g)
The nickel ionic stands oxidation much better than silver do.
(Ox 2.0) Red 2.0 (2.1) 2.2



To prevent the Sodium Cyanide from coming into contact with the zinc, the soda solution is continuously kept circulating from cell to a filter containing zinc and back to cell.
The fresh soda runs down along the zinc, the exit

is under the copper-sole

154

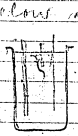
Rate of carburization ca. 1 gall per hour
Increasing of filler ca 1½-1¾

Current 0.25 Amps
The engine is 10 Sun hydrolic
submerged with No. 0
(precipitated out of

Zinc lasted all night during
first 3/4 Amp. then
blue spots appeared spongy
appear.
The nickel plate has not
been perfectly clean, or
the coating odd ca 1/4 am
loosens and forms brilliant
specks between nickel and
zinc.
When current is turned off
the zinc gives up gas.

This cell going on after 1½ hours
as the action of
action of small amounts
of deposited copper on
the zinc a short circuiting
through the wet cover.

To stop the trouble I
proposed to place the surface
of the liquid a piece
of sheet glass is inserted
between the electrodes —
intersecting the cell diagonally
to a depth of ½"
below surface.



155 Improved filter.

Copper beaker with 2/1000" holes through bottom

8	1-6	crushed charcoal
7	1	12-14 mesh
6	2	14-20 "
5	3	20-40 "
4	4	40-60 "
3	5	60-80 "
2	6	12-14 "
1	7	#13 screen cloth
	8	Zinc in drops.

#156

New plate carefully polished
Tube burn #155
Sulf. 1½ oxen 2 ahrs 1¼ gall
25, 100 per hour
0.25 amps
5 volt 3.15 ps
Scarcely ½ HH before block
spots appear

#157

Same over again
Plate rubbed with emery paper
thoroughly and cleaned ~~[illegible]~~
The corrode still reaches the
Zinc and gives black spots
after short run.

#158
With platinum wire on = sheet of copper oxide.
Nickel plate, not polished. Was cleaned with pumice.
Gives, slowly, gas on [illegible] and always black spots after 1/2 hr.

#159 Same as 158.
Perhaps a little smoother surface; gives very little gas.

#160 The same.
Plate cleaned — dil. HNO_3
gives some gas.
Scale not on #157 spontaneously in air, cleaned with HNO_3 and rubbed with pumice.

#161, 162, 163, 164

Slight differences in degree of polishing
All dissolved in HNO_3, nickeled, nickeled, boiled, rinsed, washed and run test with
All gave up gas about same extent, and all show black spongy spots after 3-2 AH

#165

Nickeled plate treated with Sodium amalgam. Gives less gas than preceding plates, black spots after 2 AH

Tried now the solution used is a mixture of: Water, nitric, dissolved Ag, nitric acid, HNO_3 in which a Ag plate (see Edison-Lalande) has been transmutating current

What is the reason for the passing? Does the sodium ions take part in the converging and at the zinc pole precipitate H instead of the sodium? Is the zinc deposited together with impurities from the sol so as to make local action or in the case of the amalgamated plate, can the impurities in the nickel by creeping outward with the amalgam form a continuous local action.

It might be possible that the ions are Na^+ and $Zn(OH)$ the latter redissolving at the anode, the former precipitating partically Zn and H from $Zn(OH)$ and H_2O

New Nickeling bath from double sulphate of Nickel & Ammonia (from Photographworks

#166

New solution from pure $ZnSO_4$ (precipt. from $ZnSO_4$ by $NaOH$ poss by NH_4) dissolved in ca 20% $NaOH$ c.p.

Amalgamated Plate

No gas

But rather early - not spongy - but a bunch crystalline deposit

During first 2-3 min. the current was kept at .32 A

The plating is rather rough but white.

The first 1½ AH deposit may be called good, then it grows darker and brush-like.

On plating off (after 2½ AH clearly) the tops of the brushes will fall off.

#167
Not amalgamated, not polished, nickeled, [illegible] same - [illegible] as no. 166 used. Very little gas but growing, dark deposit after 1/4 hr.

#168
As 167. Same, slight deposit NB after 1/4 hr.

#169
Exactly as previous exp.

170
Plate nickeled very thin, amalgamated. No gassing, but soon deposit after 1/4 hr.

#171
To test the sol from early exp. (before #166) for copper.
Sol neutralized and precipitated in HNO_3 sol acid. After 6 hours, with strong current (0.6 Amps) no trace of impurity on platinum cathode, consequently no copper.

#172
Poliobert palate dissolved in HNO_3 & nickel & beautiful coating — in the new sol. No gas but poor deposit.

173
New Tube Lot. # 155
155 renewed

7.15 0.07
7.20 0.50

174

cc 15 plates slightly varying in degree of polishing and work of the varying [illegible] [illegible] [illegible] like the best.
No plates reached beyond 1/2 AH.

175

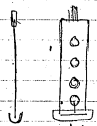
2 Plates one with and one without amalgam
Put into complete cell with copper plate # 176.
both below 1/2 AH.

176

a square glass: 2" x 2½ x 4"
used instead of tumbler, because it allows a better regulating of the stream of [illegible].

7/5'00

#177



Nickeled nickel plate amalgamated on lower end dipped a little glass tough with mercury.

During the plating the mercury vaporizes upward and forms with the deposited zinc the amalgam

Current 0.25 Amp

3.00 pm 7.15 mercury cell (1 AH

distributed over the plate current reversed discharged with 0.5 Amp.

At end of charging the surface looks perfect.

Discharge 3/4 AH -

Surface OK.

Put more mercury into the glass tube.

Discharge 9.00 pm 0.25 AH

Cell stopped at 11 pm (0.5 AH)
A rather high amount of Zn is deposited in the mercury trough and prevents the Hg globules flowing!
During night the bore surface turned dark blue.

#178.
Amalgamated plate
10.32 g Hg in the cup
10½ a.m. 0.25 amp.

After 2.1 AH charging the deposit becomes crystalline and loose. All the mercury is then used up for amalgamating the zinc.
After discharge the mercury in the cup contains but sensible zinc.

#179

As the zinc is partially deposited in the mercury in the cup, preventing it from amalgamating at the upper part of the plate, a cup is used, which fits rather tight around the plate

As in previous experiments a copper pole (#148) and the filters are used.

At start the cup contains 14.5 g Hg after 1.4 AH. The surface, especially the lower part of the plate is rough and begins to form brushes, that however do not drop off on shaking or when discharging.

P.6. AH - require 5 g. Hg.

The Mercury in the cup may contain some Zn

in spite of the small space

On discharge the mercury would separate and draw again into the cup – at all events not from the bright.

8.40 pm Discharging with 0.5 amp.

(Zn per AH: 1.2243 g)

(Pb " " 3.8812 g)

Discharge 1.25 AH.

The mercury all flows back into the cup.

Charge 1.5 AH

More finicky than first time

Discharge 1.5 AH. The plate at this point starting to gas, consequently there is

Zn in the mercury D-ion in the cup.
The 3-4 largest brushes could not be redissolved not even after mercury ox. was formed over the whole surface.

#180.
New plate, amalgamated Test run, with platinum wire as anode.
14.45 Mercury in the cup
9.30 0.25 Amps.
11.00
9.00 25 AH.
Pure, surface with brushes especially on lower part.
Discharge 0.5 Amps.
Leaves nice nickel-amalgam surface except where the largest brushes are. These remaining even after mercury

begins to oxidize

Ca. 10 cc of the soda sol with zinc (from complete cell tests) filtered twice through zinc filter, mixed with HNO_3 till precipitate is redissolved.
Cathode remains clean
Anode becomes covered with a yellow-red coating, which by dipping into HNO_3 shows all the colours of the spectrum
Apparently lead oxide.

In a sol. where H_2SO_4 is used the same takes place except that Zn depos. on Cathode.

#182

Good amalgamated plate without any ~~quicksilver~~ ~~[illegible]~~

Perfect after 1 AH.

Discharged by short circuiting with copper pole (ca. 5 A.

After complete discharging the mercury covers the entire plate

Charging 1 AH

Discharging by current. 3/4 AH

Simple mode.

Charging 3/4 AH, plate still good.

#183
10# Plate run ½ AH with
measuring cup. Then this run
next. Further 1 AH plates good.
One edge of the plate moved
to the brushes. Thump brushes,
but not block.

~~#184~~

#184

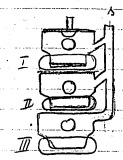


Plate divided into three parts arranged one over the other, each with its mercury-cup.

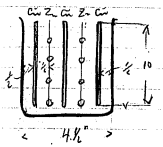
Surface 4.5 □"

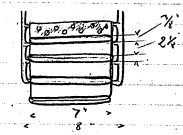
I contains 1.5 g Mercury
II 1.5 g.
III 2.0 g
5.0 g

First plating 2.5 AH, surface rough but perfectly pure.

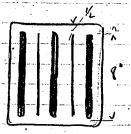
When the strip s is amalgamated the Hg will tend to collect at the lowest point of the lower plate.

— Plates down.





Thickness of Rubber jar 1/4"



Surface of two zink plates
236 □"

According to #183, the capacity is
$\frac{230}{45} \cdot 2.5 = 130$ Amp hours

Zink deposited: 130. 1.224 = 160 g
Mercury in the cups
$130 \cdot \frac{5}{25} \doteq 260$ g

According to exp # 143 - 150 & at the experiment rather for the deposition to:

$$\frac{130}{0.65} \cdot 1.49 = 2.98 \text{ g}$$

Silvering & silver wire ca. 6% :

316 g

Two nickel plates for the zink pole; thickness 30/1000.

$$2 \times 7 \times 18 \times 30/1000 = 4.2 \text{ cub in}$$

Weight: 557 g

Volume of Zinc dep.: $\frac{0.160}{6.5 \cdot 0.01515} = 1.58$ cub in

Vol. of Mercury $\frac{0.200}{13.6 \cdot 0.01515} = 1.2$ cub in.

Vol of copper ox:

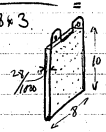
Vol of small pipe: $3/4 \times 1/4 \times 5/32 = 0.1465$

weight " " 7 g

Vol of 316 g: 6.6 cub in.

Thickness of grids:

$$\frac{6.6}{10 \times 8 \times 3} = \frac{28}{1000}$$



Thickness of plate 18/1000

Volume occupied by the nickel grid:

$6 \times 8 \times 10 \times \frac{18}{1000} = 8.04$ cu in

weight of nickel 1070 g

Vol. of Fe(OH)$_3$ solution:

$9 \times 4\frac{1}{2} \times 10\frac{1}{2} = 425$

Vol. of poles subtracted:

$425 - (4.2 + 1.58 + 1.2 + 6.6 + 8.04) =$

$= 403$ cu in $= 6.3$ l

Weight $= 6.3 \times 1.3 = 8200$ g

Weight of Rubber per inch cover.

$$\left.\begin{array}{l} 9\tfrac{1}{4} + 4\tfrac{3}{4} + 2 = 88 \\ 9\tfrac{1}{4} + 10\tfrac{3}{4} + 2 = 200 \\ 4\tfrac{3}{4} + 10\tfrac{3}{4} + 2 = 102 \\ \qquad\qquad\qquad\quad 390 \end{array}\right\} \div 4 = 97.5 \text{ [illegible]}$$

Weight = 97.5 . 1.5 = 146.25 g

Weight of zinc deposit	160 g.
Mercury	260.
2 Nickel plates	557.
Allowance for construction	123.
Weight of Zinc pole — —	1100 g
Weight of Copper oxide	316 g.
3 plates	1070.
Allowance for const.	114.
Copper pole — — — —	1500
Rubber jar with cover	10,900 g
Soda. sol	22000 g
Weight of Battery	11890 g
= 26 lbs.	
per Amp Hour	0.5 lbs

Continuation of #184.

After the first plating and discharging the cell is short-circuited, the other pole being a platinized platinum plate.

Next plating 2.5 AH.

The plating off by a mistake was continued a few minutes too long, so that part of the metal oxidized to yellow oxide. At begin of plating this drops off on some places leaving dark spots.

Plater 2.5 AH.

Where the dark spots were, the zinc gets spongy.

If the plate-half zinc-plate is left to itself for a short while, the charging will smoothen the surface nicely.

#186

The plate from #184.

2.5 g Hg in two upper cups.
2 g in lower.

3.00 AH O.K. 3.25 good
3.5 a little too spongy or brushlike
discharge 0.5 Amp. 3 Amp hour

$\left(19 \times \frac{3}{16} + 10 \cdot \frac{3}{16}\right) \times 2\frac{3}{4} =$ **13**

$25 \cdot \frac{3}{16} =$

#187

Distance between electrodes 1/4"

Zinc corrugated ~~[illegible]~~ 3/16"

as 02 to give twice the surface of an equally dimensioned plane plate

According to #185 we get of a 4.5 □" plate 3.25 AH when using 7 g Hg

Cell of same dimensions as in #185

Surface of two zinc poles: 460 □"

Capacity: $\frac{3.25}{45} \cdot 460 =$ 332 MA

Zinc deposit: $332 \times 1.224 =$ 406 g

Mercury $= \frac{7}{3.25} \times 332 =$ 715 g

2 Nickel plates (10/1000) 325 g

For Cathode 164

Weight of Zinc element: 1600 g

Copperoxide: $\frac{1.5}{0.67} \cdot 332 =$ 750 g

3 Bands (5/1000) 225

For Construction 180

1150 g

Thickness of Copperpole:

$\frac{30}{3.7 \times 10} = 0.145''$ $(+ 2 \times 0.005)$

Size of zinpole: 3/16 + deposit

Total thickness of Battery:

$6 \times \frac{1}{4} + 3 \times 0.155 + 2 \times \frac{1}{4} = 2\frac{1}{2}''$

Volume of Zn:	4.3 □"
Hg	3.3 "
2 Nickel plates	2.3 "
Copperpole	30.0 "
3 Grids	2.4 "
	42.3

Volume of Rubber jar:

$8\frac{1}{2} \times 2\frac{1}{2} \times 10\frac{1}{4} = 218$ □"

$= 3.4\ l$

Weight of Porsa: $3.4 \times 1.3 = 4.42$ kg

Weight of Rubber jar: 1.77 kg.

Zinc element	1600 g
Copper "	1150
Jar	1720
Iron + (0.5 + Zinc)	4650
	9,120 lb

= 20 lbs

$$\bar{V} = \frac{332 \times 0.07}{20} = 1.1$$

Of some chloride cells

4,5 – 3.0 – 4,8 – 5.5

63

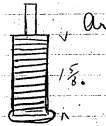
#188

Corrugated nickel plate of surface
$2\pi(19 \times 3/16 + 18 \times 1/16)\ 2\ 1/2 = 23\square''$
7.8 g mercury all in a cup attached to the bottom end.
21/5 815 pm , 0.25 A

m surface = 4 × area of plane plate.

#189

Nickel plate corrugated in horizontal direction

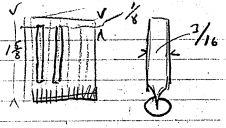


Area = 9.84 □"
(6 times that of plane plate)

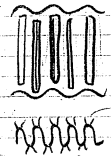
8g Mercury

20/7 9.45 a.m. 0.25 hrs.
Bleach spots on upper joint after 2.2 hrs.
(Very poor

2. 68:



#180



Surface 7 □"

2.53 times that of plane plate

10 g Mercury

Weight of 10 strips $1 \times \frac{3}{64}" = 0.32$ g.

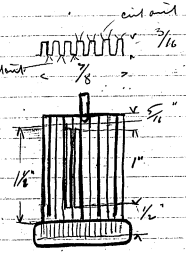
$\frac{1\frac{3}{16}}{1\frac{15}{16}} \times 4.15 = \frac{27}{10} \times 0.32 =$

$15 \times 1\frac{1}{2} \times \frac{3}{16} \times 2 = 8.5$

$\frac{8.5}{2.6} =$

$2 \times \frac{7}{8} \times 1\frac{1}{2} = 3.3$

#191



Surface 8.5 □"
= 3.3 times that of plane plate

Both lost plates poor.
Zn deposits almost only on the tops, and the plate takes scarcely more than the plane projection would lead

#192.

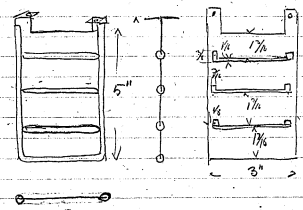


Plate consisting of 4 parts all diving — cut glass tubes each containing 3 g Hg. surface 17 □"
Positive poles joined by two strips of platinum 5/8 by 3"

The anodes are too small, causing the ~~Hg~~ to deposit on. Long brushes and middle of plate leaving the other parts almost bare.

#. 193

Same plate with the small connecting strips (a) asphalted so as to prevent mercury from running down into lower parts.

Positive pole two nickeled nickel plates 5" × 3" ea 3/8" found yellow

Each cup Hg Hg

Inspect very nice after 12½ AH. [corresponding to 3.25 on the small plate to 184]

The current ought to have been 1 amp, but to help the amalgamation let it not be diminished – 0.75 Weight of sections probably too large

The amalgam formed as after 12 AH still perfectly bright, and might stand more Zn if it was not so brittle

If the space between the poles could be filled with glass-wool or asbestos without meeting other difficulties, the Zn might be deposited, as long as it would stay metalline bright, without any danger of dropping off

#195

Plate #192 with the positive pole formed of one piece and around the negative pole - and the space filled by a layer of glass wool. 6g Hg in each tube.

After ca 10 AH there has and a spot where the layer of wool has been to loose, formed a bridge over to the anode

— The amalgam is nicely interwoven by the glass wool and a disappearance of absolutely prevented

#196

#183 with positive poles like in 195 and space filled by pure asbestos.

Here the resistance between the poles is still more irregular so that a bridge is formed after ca 2 Min.

#197

Plate with a strip of asphalt. Warm plate and rubbed with piece of copper.

After a short time while the asphalt is broken off from plate.

Plate with a row of holes along the edge. Warmed and dipped into melted asphalt

After 3 hours floating shell perfect

After reversing twice shell alright

After one week run in water overhours shell OK.

Small holes through the asphalt formed by air bubbles in the melted stuff

#198.

Plate #185 with new positive plates formed by a sheet 1/32" thick

glass wool stopped in between plates allowing trying to get the same density all way down.

Granted after 28 M. where the [illegible] is homogeneous the zinc deposit is ideal, but there were a few bridge formers.

A very loose packing of glass wool might give better results but Mr. Edison abandons the glass wool for sake of its solubility in soda.

#199

New plate like #192
Surface 16 □"
Packed with powdered asbestos 24½ hrs.
Opened after 15 hrs.
Where the asbestos has been packed even and hard, the zn deposit is finely distributed in the first ¼ of the cell but especially in old corners and where there is a middle opening or less dense place the layer of asbestos fibre will be formed a bridge the cell thus being short circuited.

Mr Edison gives it up on account of the difficulties in getting a circulation in the soda

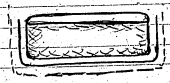
#200

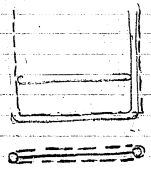
Plate #183 with
8 g Hg and Amorh #198.

After 1 HH was 4 ☐" the
surface is fine – there
may be rather off some
crystals" with finger,
"but a drop gone off" from
shaking in holder

Finished 8 g Hg

On places, where the
amorh. the cathode
the current density will
be higher and the forming
of brushes or crystals will
occur sooner. So is the
case along the edges of the
sections of the
plate.





#207
Same as #200, anode cut as in figure. 8g mercury.

Plate OK after 8 AH.
Discharge 7 AH with the biggest Pt. electrodes, which do not plate down quite even.
8g mercury in each tube: 8g

[ITEM FOUND IN BOOK]

	No	Weight	Time	Amps per 100																																									
Reduced Copper scale	67	11.00		4.0	4.5	4.5	4.0	3.7	4.0	4.0	4.2	4.5	4.0	⊗	4.7	4.9	4.2																												
Nitrated in $AgNO_3$				42%	49	49	43	40	43	42	45	49	43		51	53	45																												
16 gr. scale 0.050 g $AgNO_3$	76	6.35	21.5c	2.6	2.6	2.9	3.0	3.1	2.5	2.9	2.9	2.9	2.2	X	2.3	⊗	3.7	2.1	3.4	3.6	3.7																								
				40%	50	55	57	59	49	55	55	55	41		44		70%	40	65	69	71																								
15 gr. Scale 0.100 $AgNO_3$	77	5.30	25.1c	2.5	2.7	2.5	3.0	2.4	2.4	2.4	X	2.0	⊗	2.3	3.4	2.1	3.4	3.5	3.5	3.5	3.0	3.0	2.2																						
				57%	61	57	68	55	55	55		45		53	77	49	72	79	79	79%	68	68	53%																						
0.500 $AgNO_3$	78	8.35	53.4c	4.0	4.5	4.6	4.3	4.9	4.8	5.0	X	5.1	⊗	5.0	5.3	5.8	4.8	5.55	5.5	5.65	5.55	5.6	5.7	5.1	5.0	5.0	4.8																		
				42%	65	67	70	70	69	72		73		72	71	69	69	80%	79%	81%	80	80%	82%	73	72	72	69																		
0.100 "	79	7.20	25.1c	3.1	2.8	3.0	3.0	3.5	3.2	2.2	⊗	2.5	2.9	2.9	3.9	3.2	3.4																												
				43%	47	50	50	58	54	54		58	49	49	65	54	57																												
0.100 " (Broken Avg.)	97	6.05	25.1c	2.3	2.6	2.9	3.1	3.4	3.2		⊗	2.4	3.7	2.3	3.4	3.5	3.5	3.1																											
				48%	52	58	62	68	64			48	74	42	68	70	76	62																											
0.200 "	98	6.20	32.2c	2.6	3.2	3.5	3.6	3.7	3.7	⊗	X	2.3	3.7	2.1	3.4	3.7	3.7	3.7	3.0	2.9	2.3	1.6																						
				55%	61	66	69	72	72			45	72	41	64	72	72	72																											
0.050 "	99	6.95	21.5c	3.0	3.2	3.1	2.9	3.0	3.5	4.5	3.5	4.1	4.0	3.9																														
				53%	55	53	50	52	60	79	60	71	69	66																														
0.200 " Broken & burnished	104	9.50	32.2c	4.0	4.8	5.5	4.3	5.2	5.1	5.3	5.3	5.2	4.1	4.6	4.4																													
				57%	59	69	53	66	64	67	67																																	
0.200 " Broken & Stopped short	105	8.95	32.2c	3.0	3.4	5.1	4.0	4.5	5.8	5.1	5.0																																	
				47%	45	68	54	61																																					
0.200 " Broken 100	106	6.80	32.2c	2.6	3.3	2.9	2.4	2.8	3.1	3.1	3.1	3.0																																
				46%	58	52	52	50	58																																				
0.250 " Broken carefully on screen	108	6.90	35.7c	3.5	4.4	4.0	4.0	4.8	4.0	4.0	3.4	3.5	3.5																															
				61%	69	69	69	69	69																																				
0.210 as 108	109	6.50	35.7c	4.1	4.1	4.2	4.2	4.2	3.9	3.5																																		
Scale cleaned in HNO_3				76%	76	78%	78																																					

X means fresh Soda

⊗ After this mark is always given the number of Amp hours for the reduction when the cell has been charged 2.3 AH after begin of gassing

Finished at 6 o'clock from 4 p.m. on 20 inst. from time of commencement of deposition

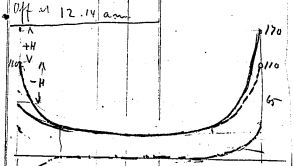
I Positive pole brought to slight gassing

5% Sulfuric acid

Then reversed:

	Voltage	Current	Resist	Reversed		
9.39 pm	.45	.0790	(5.70 Ω)	11.30 pm	.54	.0785
9 39 30"	.38	.0790	4.82	35	.42	.079
40	.36	.0790		38	.355	.0785
45	.322	.0790		42	.355	.0784
50	.303	.0780		48	.310	.080
55	.300	.0782	3.84	58	.300	.0792
10 0.0	.298	.0780		12+8	.305	.0790
5	.297	.0775	3.83	8	.318	.0792
10	.299	.0770		13	.295	.0794
15	.301	.0770		Off at 12.14 am		
20						
25	.370	.0770				
30	.372	.0770				
45	.390	.0773				
55	.490	.0790				
1100	.660	.0794				
05	.800	.0800				
10	1.300	.795				
15	1.740	.802				

8 amp.



Real resistance curve ---

Resultant curve ——

Polarization curve -·-·-

High resist. due to Hydrogen and points of contact between grid and copper being transformed into black CuO(?)

45 110
55
170
90

[ITEM FOUND IN BOOK]

After 20 hours soaking in the 5% sol exp continued:

8.23 p.m.

8.23 p.m.	42	.077	
24 "	315	.077	
25 "	—	.077	
27 "	370	.0762	
28 "	380	.0768	

Soaking apparently if not influence at all: 12.14 a.m. .345 (.0779)
8.28 p.m. 370 (.077)

Reversed in 5% sol
8.30 p.m.

Plate now 3880 / 7028 exhausted.

8.30.45"	.22	.077	
31 "	.236	.0768	
32 "	.245	.0768	
33 "	.245		
34 "	.244		
35 "	.250	77	
38 "	.259		
39 "	.260		

Res. it during this time work up to concentration in negative plate. It is it in a strongly ascending curve of resistance?

Now 10% sol

change of sol gives in all 20% decrease of resistance

8.40	215	77	
42	212	77	
44	211	77	
45	211	77	

Dropping during these 5 min due to slow change of sol in porous pots or only in positive plate.

Now 20% sol

8.46	200	77
48	200	
50	203	77

5% decrease of Resistance. We are on the ascending part of the curve (?)

Now Concentrate (Probably around 50%

8.51.	368	765
52	382	764
53	391	762
54	400	762
55	407	760

Now back into 5% sol

8.56	.245	.0762
57	240	762
58	239	
59	239	
60	240	0762

Effect of this very evident: slowly removing sol in pores (i.e. pores) but curve ascending strong

[ITEM FOUND IN BOOK]

By transferring from 5% sol to 10% :

in 5% sol	in 10% sol	
8.30 .22 Volts.	8.40 .215	.004
8.15 .25		
8.39 .26	.45 211	

As the curve is ascending, the drop due to change of sol in the pores can be just ca. .008 or 3% of the whole change.

from flat part of curve -

from ~~Stock~~ 40% sol to 20%

Observe drop during first 10 minutes to determine rate of ~~[illegible]~~ exchange of sol in pores.

.1225 ~~[illegible]~~ 2.40

.4 - .10

.490 42%

[ITEM FOUND IN BOOK]

III

Move in 20% sol.

86

7020
6A
.187
7000

9 01	202	0759
2	208	762
3	210	762
5	217	760
10 2 40		760
15 3 00		760

Strongly ascending, last point of curve. Poles now $\frac{6640}{7020}$ exhausted.

Once large pole (b) (Eg oxide) reduce half oxidized
& smaller pole $\frac{6640}{7020}$ reduced. (a) now to 2. ~~oxidized~~

9 35 pm	109	0772
40	115	076
45	119	0748
50	120	
58	120	0752
10 00	125	0745
10	130	0748
15	130	0748
20	130	0735
25	132	0745
30	134	745
35	140	745
40		

Equilibrium sol for 10 minutes

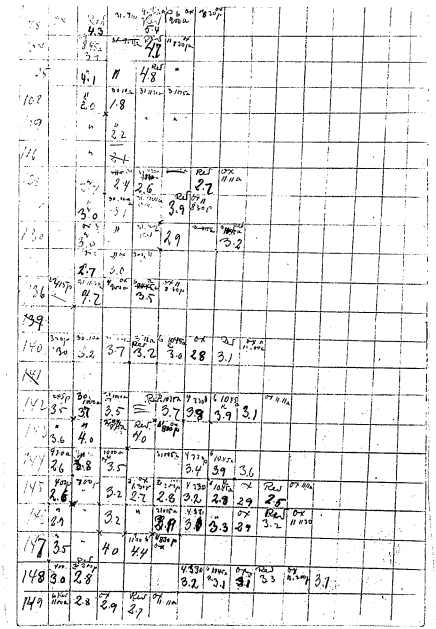
10 57	138	730
52	140	730
55	142	728
11 00	150	720
11 10	160	740
15	165	742
20	180	745
25	200	740
35	420	730
40	1100	715
11 42	1200	

Quit 11 50

[ITEM FOUND IN BOOK]

76	CX Comp	4.8
105	to OX Comp	4.2
129	"	3.8
136	[illegible]	1
140	to OX Comp	3.2
142	"	3.8
143	to OX Comp	5.0
144	to OX Comp	4.2
145	"	2.9
146	"	3.2
147	to OX Comp	5.0
148	to Comp	3.8
149	"	3.2
152	[illegible]	2.0

[ITEM FOUND IN BOOK]



[ITEM FOUND IN BOOK]

136	Scale, sieved: (0.25 to 13 mm) broken through screen 0.4g wire, twelve folded & softened	795g	43 65%	55 77	43 65%	55 75	43 65%	47 71	40 60%	3.5							
140	As #136.	132	26 50%	30 57	30 57%	30 57	28 57%	30									
142	Sieved (0.5 to 15g) 0.4g twenty doubled wire.	600	32 64%	37 74	33 66%	35 77	38 75	39 78									
143	Sieved (0.3 to 15g) 0.3g fifteen doubled wire.	600	33 66%	40 80	33 66	40 80	33 66%	43 86									
144	Sieved scale (0.3 to 15) - through 40 mesh 0.3g twenty doubled wire.	635	26 50%	31 56	32 56	37 64	39 62	39 73	33 62								
145	Scale between 10 & 20 mesh	492	26 53%	32 74	28 67%	30 72	29 70%	25 61									
146	Between 20 & 40 mesh	533	29 65%	32 72	29 65	31 70%	31 70%	33 75	29 65%								
147	Between 40 & 100 mesh	686	35 61%	40 70	36 63%	44 78	37 65%	45 80									
148	As 143	556	30 62%	46 83%	32 68%	45 78%	31 64%	33 68									
149	Scale sieved 0.5 to 15 inches with woven sieve, copper ribbon (0.3g, 3 layers)	600	30 60	30 60	29 58	31											

[ITEM FOUND IN BOOK]

170.10
44.77 } Potash yes 1.192

175.95
38.43 } Soda ~~1.417~~ 1.350

[ITEM FOUND IN BOOK]

77	130	1.1	3.0												
78	005	4.5	2.4		4.4			15	5.0		4.5				
104	.	4.0	2.0		4.1				4.2		4.2				
105	.	4.2	1.8		4.4				4.9		4.5				
158	.	1.0	3.0		2.9	1.1			2.3		1.4				
158	005	3.9	2.0		3.5				2.9		3.1				
107	005	4.5			3.4				3.5		3.3				
114	.	2.1	2.0		2.8	2.0			2.8		3.0				
115	.	2.9	2.0		3.0				2.8		3.0				
116	.	2.3	2.0		3.1				3.2		3.0				
117	.	0.5													
118	.	2.9	2.0		2.6	2.1			2.6		3.0				
119	.	3.1	2.0		3.2				2.9		3.0				
120	.								3.3		4.0				
121	.						132		2.1		4.9				
122	.	0.3													
128	005	2.8	2.0		2.5	2.9			2.6		2.7				
129	100	4.0			3.4	3.1					3.4				
130	"	3.5	2.5		1.0	3.0			3.4		4.0				
131	"	4.0	3.9		1.0	3.6					3.5				3.6
136		0.8	3.9		1.5						5.2	4.3			

[ITEM FOUND IN BOOK]

	Spun Dye	Vinyl	Ref										
78	0.05 4.5 0	3/4	4.4	0									
108	0.05												
109	0.05												
*128	0.05 2.8					Ref							
*129	0.05 2.9	2.0	4.2	0.07		2.5 3.5	2.5						
*130	0.05 2.9	2.0	3.5	0.07									
*131	0.05 (0.0) 2.9	1/4	4.0	0.07		3.6	3.6						
136	0.05 4.5					4.8	4.5						
140	0.05 2.6					3.5	3.5						
142	2.45	3.5											
143		3.6											
144	0.50												
145	0.05 1/4												
146	"												
147	"												

Notebook, N-00-06-22

Rabbing
Experiments.

June 22nd 1900.

201

One edge of a regular nickel plate dipper was dissolved clean. When dry soaked in bichromate of Potassium and exposed to light for several hours.

The soda at first seems to extract the colour to a certain degree, then dissolves the gelatine (plate being coloured)

#202

Nickel plate partially dipped into a sol. of gelatine in Water and dichromate – exposed to light.

Plate used as cathode
Hardly same behaviour as #201.

#203

Warmed plate partially covered with paraffine.
All iron off plate in a few hours

#203 b

Redipated plate with paraffin
Iron off bare one side
Penetrated by Zn

#204
Plate rolls a strip of Schellack

Schellack dissolves and gives foam on top of liquid, colouring yellow.

#205
Kautschouck dissolved in CS_2
After some hours quite sparingly and loss and not fully preventing decomp of Zn. Perforated plate may work better

#205 b
On perforated plate.
Gives a little foam, which afterwards disappears but some places penetrated by the Zn.

#206 (Perforated cake)
Cake of plate powder
with Kieselguhr in Clay
press and soaked in
sulphur at ca 130° for 3 hrs
then given a few mm
at 150–160°.
Proper phenol sulph. extract
over day boiling soda
fine after 2 days serving
as bulk jelly.

#207
cannot get any sol of Hard rubber in CS_2 strong enough for a coating.

#208
Copal Varnish

#209. Lanoline
Perforates plate
but appears gas bubbles

210
Pitch in benzol
(Coal tar pitch)
Perforated plate
Pitch dissolves quickly.

#211
Sugar, baker
Not dissolves but
flakes at
Perforated plate will
give perhaps better results
than asphalt in # 197

212

Japan on perforated plate; amalgamated

Flakes off after 4-5 hours

213

7 different brands of asphalt dissolved in benzol and water on perforated plates.

214 (a) Cuban

Very brittle, falls off.

1915 b.) (Scotch.
Found a loss soft coating after being particular flaked off by the Zu

1916 c.) Virginian
Better than previous two, thong pieces broken off

1917 d.)

1918 e.) +

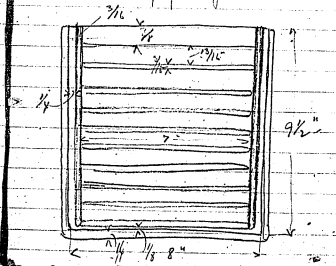
1919 f.) Trinidad

320 lw) - Lost Measure.

221

Weight of a battery with distance between poles 3/32" and and 1 amp hour per 30" (per 4" melt.)

Cell containing 10 zinc and 11 copper poles



Surface of one plate: $2 \times 9\frac{13}{16} \times 7$
$= 2 \times 5 \times 10$"

10 plates 1000 □"

Total amount of Zn
300 AH

Active 250 AH

Copper oxide: $\frac{153}{65} \cdot 149 = 575$ g/100
(460 g ea)

Vol of copper ox: $\frac{0.1465}{7} \cdot 600 = 12.7$

per grid: $\frac{12.7}{11} = 1.15$

Thickness: $\frac{1.15}{7 \cdot 9} = 0.0783$

$+ 2 \times 5/1000 = 2\frac{3}{1000}$

Breadth of cell:

$10 \cdot 3/16 + 11 \cdot \frac{2.5}{1000} + 3/16 = 2.37 = 2\frac{3}{8}$

Weight of Zn (25% to stay in sol.)

$1.25 \cdot 300 = 1224 = 460$ g

10 plates $3/1000$: $10 \times 9\frac{1}{2} \times 8 \cdot 3/1000$
$= 3.8$ cub in $= 448$ g

Wicket in grids
2 × 11 × 8 × 9 i.e. 5/1000 = 8.40 cubic
on 1000 g.

Mercury : 2 × 300 = 600 g.
Vol of - 2.3 cubic

Vol. of jar : 170 cubic in

Plate	3.8
Grids	8.4
Copper	3.35
Mercury	2.20
	17.75

Vol of Soda : 172 cubic in
or 2.82 l weighing 3550 g

Weight of jar 1600 g

Weight:

Zn	660	
Peale	448	
Mercury	600	
allowance	400	
Zinc peale		1908 g
copper ox	575	
Zinc	1000	
allowance	400	
copper peale		1975 g
Soda	3650	
Sor	1600	
		5250 g
total		9133 g
or	17.1 lbs	

per Amp hour $\frac{17.1}{250} = 0.0685$

Per Amp hour per lbs

$\frac{250 \times 0.67}{17.1} = 9.8$

Lead acc: 4.5-5.0-4.8-5.5
6.5-6.8-

Theoretical cell:

Hg on Carbon — [illegible]

Zinc carbon

The porous carbon plates take up their own weight of Water and which per 100 cm² of a 1/8" thick plate 13.12 g. Vol = 31.75 cc

Cd per 1 AH. 2.1 g, ~~1 AH~~

Hg - 1 - 3.78 g

The cell gives .84 Volt

Cd per 1 VAH 2.7 g ×

Hg - 1 AH 4.78 g ×

6 WPH = 4470 Watt hours

Cd per 6 WPH 12.07 kg ×

Hg - - - 20.77 - ×

Weight of Carbon being 1/4 of Wof

Carbon 3.02 kg

Area of Carbon 3.02 = 230 dm²

Vol of Plates 31.75 (13.2) 230 = 7302 cc

Vol of Solution 3657 "

Weight of Sol 4.75 kg ×

10.61 kg = 90 lbs

Cd is not absolutely insoluble in Soda & Potash and will consequently slowly dissolve out of the pores and plate back on the surface of the carbon-plate - carbon plate (a bad big)

Iron instead of Cadmium

Theoret. voltage ...

Obtained .86

Weight per 6 HPH

$$\frac{12.07 \cdot 0.9}{0.8} \cdot \frac{\pi 6}{112} = 6.8 \text{ kg}$$

6.8 kg = 15 lbs

Fails for staining with Acid Carbon to give porosity

Phosphate of Magnesia

Phosphate of Barium

Beautiful, ideal for the purpose - except that it is completely insoluble and cannot be removed.

Phosphate of Strontium

Good - eats out during 10 hours in use.

Borate of Magnesia
Powders poorly and does
not mix well.

Borate of Lime

Borate of Strontia

Borate of Barium

Fluoride Magnesia
Sticks together

Fluoride of Lime

"

Fluoride of Strontia

"

Fluoride of Barium

"

Prussian blue

Barium Ferrocyanide

Lead Ferrocyanide
Very fine

Manganous Ferrocyanide

Stannous Ferrocyanide

Phosphate of Tin

Phosphate of Lead

Borate of Tin

Borate of Lead

Sulphate Calcium

Manganous Sulphate

Strontium Sulphate

Manganate Barium

Manganate Strontium

Manganate Calcium

The best results are obtained by saturating a solution of amm. chloride Carbonate or Oxalate at ~~100~~ ca. 80° C and cooling or freezing mixt, stirring well.

Carbonate gives fine little crystals, that grow during drying.

To prevent this we wash with alcohol

Oxalate Amm gives beautiful needles only a few 1/1000" thick and some 50/1000" long.

Chloride Amm behaves nearly like the Carbonate

1 5/16 × 3

5" × 1/8"

The second Cadmium cell has 6 copper plates 2 1/2 × 1 5/16 × 1/8

total weight copper: –

Cadmium Sul is built on frame of square tube and has plane surfaces.

The three sections held in all 153.6 g mond Cd.

Weight of Sul 36.4 g

Cd is cleaner w. H_2SO_4 before packing and packed very hard.

The cell was discharged the first time through same resistance as used for first problem (ca. 750 ohm) and gave 1.25 A. This kept up for days and soon in all 32.4 AH (153.6 g $CdSO_4$ ought to give 36.5 AH)

The copper plates inner were black, oxidized at red heat.

Copper then reduced all during current and cell

$\frac{.03}{0.5} = 0.06$

charged at 2, 1.5 & 1 amps.
in all 22 AH.
Then gives good at Cd cell
even for small currents.

Discharges through meter
over resistance. Current at
start: .46

8.30	46A	42		37				
9.00	48	40		37	10.00	48		
10.00	48				11	48		
11.00	48				12	47.5		
12	48.5				1	47.5		
1	48.5				2	48		
2	49	41		38	3	48		
3	49				4	48		
4	49				5	47		
5	49				6	47		
6	49				7	47		
7	49				8	47		
8	48	40		37.5	9	47		
9	48.5				10	47	40	36
10	48				11	47		
11	48				12	47		
8.30	4	45			12.30	47		
8.35	48.5	40		38	9.00	47		
9.00	47				10.00	47		

	47			
11	47			
12	47			
1	47			
2	47	38.5	35.5	
3	46			
4	45			
5	45.5			
6	45.5	38.5	35.5	— 19½
7	45.5			
8	45.5			
9	45			
10	45			
11	44.5			
12	44.5			— 32.00
Monday				
8.15	—	—		
9.00	44.5			
10	44			
11	43			
12	42.5			
1	41.5			
2	40			
3	35			→ 23.58 AH.
4	18			

Charging:

5.00 pm, Monday Nov 19. '00

5.00	2A	6⅔	17⅔ AH
11.30	2		
2.30 8.20	2	2⅔	
10.40	1		
	6 pm	Sunday	6.⅔

Total 24 AH.

Nov 20 '00

New grid for Cd

2 1/4" by 1 3/8" by 1/8"

Weight 9.7 g

Loaded 37.0 g

Cadmium 27.3 g

6am	0.3			3	41
6:30	0.43 x 42		33.1	4	40 out
7	0.37		27	11	42
8	.37			12	42
9	42			1	41
10	42			2	40
11	43 x 25			3	38
8	42			4	38
9	43			5	39
10	43			6	40
11	43			7	42
12	44			8	40
1	44			9	42
2	44			10	39
3	43.5			11	39
4	43.5			12	39
5	43.5			1	36
6	43			900	25
7	43			10	24
8	43			11	26
9	43			12	25
10	43			1	7
11	43				23.34
12	43				
1 am	42.5				
2	41				

Test Orange cell from external source
1.5A in discharging direction

Charge at 10 am 24/11/60

10 am	2 Amp.	at	13 AH.
5	2		
8.45	1.5 Amp.		
4.45	1.5	out	14.25

Total Charge 27.AH.

24/11 Discharge.

6.00	25	1/10	21	7.00	44.5	38	34.5	
7.30	38		30	8	45	37	34.5	
8.00	37			9.00	44.5	37	34.5	
9	40	1/10	32.1	10.00	44.5	37	34.5	
10	40		32	11.00	44.5	37	34.1	
(10.00)	(45)	(40)	(35)	12	44	36	34.	
11	45	39.5	34.0	1	43	36	33	
—				2.30	43	35.5	32.3	
9	43	38	34	—				
10	43	37	34.5	10.00	43.	36	33	
11	44	38.5	35	11.00	42.5	37	33	
12	44.5	38	35	12	42.	36	33.5	
1	44.5	38	35	1	42.5			
2	45	38	35.5	2	42.5			
3	45	38	35.5	3	42.			
4	45	38	35	4	41.5			
5	45	38	35	5	40			
6	45			6	39			
	1038				1029			

7.45	38	1038
900	37	1029
1000	35	157
11.00	32	22.24
1200	25	
	15.7½	22.24 AH.

Charge at 25 Amps. 9.00 [illegible] 30 Nov.

8.55 ~~25~~ Amps

2 55 2.5 Air Lee 4 } 15.

4.00 1 Amp

10.00 1 Amp } 8

12.00 p 1 Amps.

8.55 a 1 Amp 0.5

9 25 11A

Total charge 23½ AH

Dec 3

9.30 am	36
10	
11.	37
12	37
1	39
2	39.5
3	40
4	40
5	40.5
6	40.5
7	41
8	41
12	37.5
8	37.5
11	35.
12	37
1	38
4	39
6	39
9	39
11	38.5
12	39
9	37
11	37.5
2	35
4	34.5

6.	25
8	25
10	12

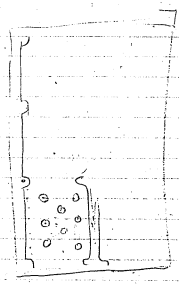
Ch

Charging: Dec 5 '00

11 am	25 A	3/4 H Charge
~~6 00~~	25	
6 00	1 A.	2

a/m 2 HH discharge of 25 A

10.00	47			
11.	37			
12.	38	35V		
1.30	36	34	39	
5.00	39	35.9	40	
9.00	39			
12	45			
8.30	44.5			
10.30	40			
12	41.5			
6	40.			
10	43			
12	35			
8.30	34			
12	34			
3	30			
6	24			
9	14			
11	1			



HgO-KOH-Fe - Cell

22 Cells 16 plates 1/4" thick
1/8" apart, Size 4×8".

Experimental Plates: 2.81 sq in
and 5/32" thick
holds 15 g Hg metallic and
3 g Fe metallic

Proportion of Plates

$$\frac{2.81 \cdot 5/32}{4 \times 8 \times 1/4} = \frac{1}{18.2} = .0549$$

Mercury in one Plate:
15 · 18.2 = 273 g Hg
In 8×22 Plates (176 Plates)
48 kg = 110 lbs

Iron in one Plate: 3 · 18.2 = 54.6 g
In 176 Plates: 96 kg = 212

Weight of 1 Cadmium plate = 18.2 · 4.8
= 87.4 g
In 176 Plates 15.35 kg
= 33.8 lbs

Weight of 1176 Hg Elements

Hg	110
Carbon	33.8
	= 143.8 lbs

Of Fe Elements 21.2

Carbon	33.8
	55.0

17 grm = $\frac{16}{72}$ 21.2 = 4.7 lb

Size of Cell:

$4\frac{1}{2} \times 6\frac{3}{8} \times 9\frac{1}{2} = 258$ cu in

$= 16.4 \cdot 258 / 1000 = 4.23$ l

Vol of one Plate.

$4 \times 8 \times \frac{1}{4} = 8$ cub in.

Of 16 128 cub in = 2.1 l

Vol of Solution = 42.3 − 2.1 = 2.13 l

Weight of 20% Sol − 1.2 · 2.13 =

= 2.55 kg = 5.7 lbs

Weight of Hg Element	143.8
Fe Elem	59.7
22 lbs 20% Solution 57.22	126.
	329.5

36
176

Discharge small plate
at 1/2 Amp
Taking
Large plate: 9.1
Battery 72.8

Capacity of Battery:
Small plate 2AH
Large " 36 x AH
Battery 6400 AH
at 0.9 V 5760 VAH
= 7.73 HPH

Test of Automobile battery.

Battery charged over 45 miles (at 110 V & 80 Amps)

discharge:

8.35	25 Amps	95 V open	87.5 V
9.05	20.3	90.2	85
	25		84
9.35	23	88.5	82
	20	?	82.2
10.05	18.3	78	73
	20		72
10.75	18	78	72

AH: 36.000 79.2

Work: 3.96 HPH.

Charge:

10 48 pm	19.6 A	96 V
11.04	18	99.5
	20.4	100
11 27	18.7	101.2
	20.5	102
11.50	20.5	104.4
12 15	18.2	109
	20	110
12.35	17	112
105	8	108

40.16 AH

Total work 4100 AH - 5.5 HPH

Open circuit: 97.5 (2.2)

Discharge		E	E	R	
2.30 pm	16.75 A	89.6			0.233
2 55	15.4	87.5	91		
3 10	15	87	90.4		0.21
3 25	15	88.8	90		0.213
3 40	15	86	89.5		
3 55	15	85	89		
4.10	15	84.5	88		
4 25	15	83.5	87		
4 40	15	81.8	86		
(4 48)	(15)	(78)	(83)		0.28
4.55	15	75.7	80.5		
(5 00)	(15)	75.2	80		
(5 05)	(15)	74.8	79.2		
5 10	(15)	73.8	77		

40.5 AH

Average Voltage 79.7 V

32.30 WH = 4.34 Hp

Internal Resist.: 0.233

per cell 0.0053

Charged at 10 Amps till voltage reached 110-112V.

Discharged at 15 Amps.

			94.2 open
1.25	16.9 A	89 V	
1.40	16	88.5	91.7 V open
1.55	15.4	88.1	91.3
2.10	15.1	87.9	90.8
25	14.9	87.4	90.3
40	15	87	90
55	15	86.4	89.6
3.10	15.1	85.6	89
25	15.1	85	88
40	15	83.9	87
55	15	82	85.7
4.10	15	80.6	84.5
4.25	15	76.6	82
4.37	15	71.2	78.5

47.5 AH Av V. = 80 V.

Work = 3800 WH = 4.56 HPH

Measurements on the windings of the motor

Armature terminals:
50 Amps, 7.3 volt
Resistance: .146

Field terminals:
50 Amps 4.2 V. R = .084

Armature, one brush, sep.
50 Amps. 6.5 V R = 0.13
Diff = 0.016 v (one brush

Other brushes, sep.: 3.2 v
turning 3.7 V.

20 v Amps
R =

Efficiency at 32 Amps
92 %

Weight of repaired batteries:
4 × 8.27 =
of old set:
4 × 2

Weight of Austin 38 lbs

Total " " Vehicle		2610 lbs
whereof on front Wheels		740
" rear "		1870
		2610

545

X) a

B

I.

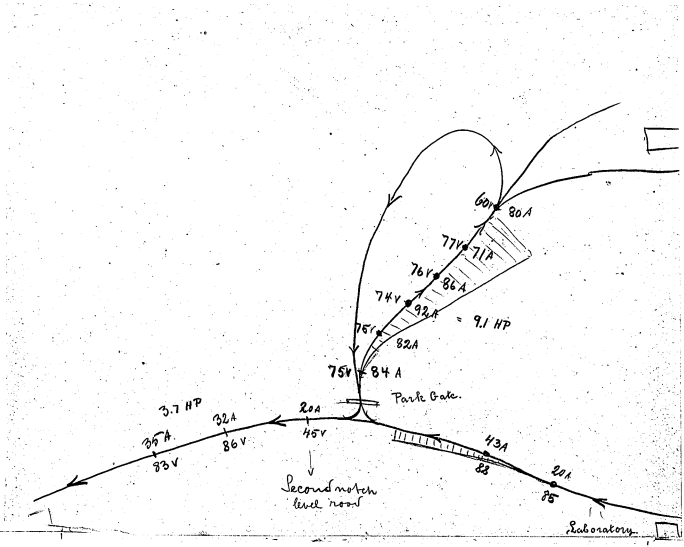
Oxide Storage battery: 75 AH

Charger 1a 10 Amps. 2.6 V.

	y	a	E				
Open			2.11	5.00	405	188	197
9.00	55			6.00	38	185	
930	53.4	2.00	2.075	630	33	185	197
10 00	525	2.00	2.075	8.00	27	177	190
11.00	504	2.01	2.07	9.00	23	180	180
1130	48.6	1.99	2.05	930	55	184	185
12.00	48	1.985	2.060	10.30	31	138	125
12.30	48	199	206				
1.00	47.2	197.5	205				
1 30	47	197	205				
2.00	50	197.5	205				
2 30	49	196	204.5				
3.00	47	196	204				
open			208				
10.45	48.8	197.5					
11 00	45	195	204				
11 30	43.5	195	203				
12	44	194.5	202				
1	52.5	191	201				
2	49	191	201				
3	44.2	190	198				
4	44.2	180					

75.44 AH

[ITEM FOUND IN BOOK]



[ITEM FOUND IN BOOK]

Running:

	D	V
First notch	7.5	22.8
Second	8	44.8
Third one wheel	8	22.5
Reversers	7.6	225

1245

[ITEM FOUND IN BOOK]

$$R = \frac{0.076 \cdot e}{q} \; ; = \frac{0.076 \cdot 0.1265}{3.230} = 0.00265$$

$$q = \frac{5}{1000} \times 1 \times 254^2 = 3.23 \text{ mm}^2$$

Resistance = 0.00265 Ohm

7.89 Kg
0.076
0.1265

Drop at 50 Amp.

$= 50 \cdot 0.00265 = 0.1325 \text{ V}$

Current per sq mm: $\frac{50}{5/1000} = 10000$

1.1 20

[ITEM FOUND IN BOOK]

1AH : 2.1 g. Cd = 1 CdO

4.25 Cd^{2} (CdO)

8.45 50% Eff-y.

IVAH • 19.9 g

745 VAH 14.222 kg. = 31.2 lbs.

1AH : 1.2 g. CuO

2.4 CuO

4.8 50%

IVAH = 10.91

745 VH 8.127 kg = 17.4 lbs.

Oxygen 1.08 lbs.

4.968

20 184 8.4 : 1 =

150 g / 42

4.25 — 1AH

150 g — 100 / 42

150 / 84 / 2.4 / 100

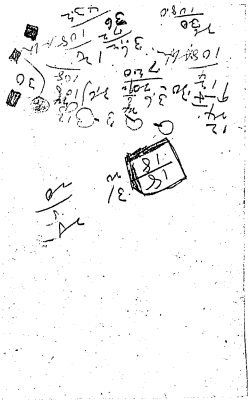
150 / 2.4 / 0.60

746 / 64 / 1000 / 100

32 / 2 / 33

174 / 8 / 16 / 64

[ITEM FOUND IN BOOK]



Kennelly,	Standard
5,	4.62
10,	96,
15	13.4, 8

Reduction : {0.9R

[ITEM FOUND IN BOOK]

[ON BACK OF PRECEDING PAGE]

Wirt "Auto" Battery. Discharge on
Constant Current.

efficiency

2. 85. ÷ 89. = .956 Efficiency
8. 84. ÷ 89 = .944
11. 78. ÷ 84.5 = .923
16. 71. ÷ 78. = .912

Notebook, N-00-12-28

Storage
Battery
Tests
Dec 28 1900

No. I (A)

Chloride Cell used in Columbia Autos-mobile.

Description of cell.

See Drawing.

Calculations.

Wt of 3. Lead frames of positive pole: 3×2.88 = 8.64 ozs
3 ears 3×.373 = 1.12
Connecting piece .80
10.56

Weight of dead lead 52 lbs
= 2360 g.
Total weight of Pos. pole by weighing 4950 g.
Weight of active material 2590 g.

$\frac{2740}{4900} \cdot 100 = 44.5\%$

Negative pole:

Frame of two inner poles 1.40

" " two other poles

2 × 2.7 5.40

Two inner cans

2 × .373 .75

" other cans

2 × .273 .55

Connecting piece 1.00

10.70

Weight of dead load = 5 lbs = 2300 g

Total weight of negat pole 3740

Weight of active 1440

or $\frac{1440}{3740} \cdot 100 = 38\%$ of Total

Weight of Parts of Cell

Positive Pole 10 lbs 13 g = 4900 g

Negative Pole 8 " 4 g = 3740 g

Liquid 1800 cc 1625 g

Rubber cell 1 lb 2 ½ oz = 520 g

cover 38 g

6 Lorrigait Rubbersheets 52 g

Ply 4 g

Rubber rods 30 g

Potash 102 g

11000 g

11000 g = 24.2 lbs

Cell, as received from the Auto' company charged at 10 amps till slight gasing.
The Discharge-current is kept constant at 20 Amps.
The open Voltage is read as soon as Weston meter comes to rest it is free from pendulum.

	Ohms	Amps
20 ÷ .055 =	.00275	[illegible]
20 ÷ .06	.003	.06375
20 ÷ .08	.004	.08975
20 ÷ .09	.0045	.10175
20 ÷ .105	.05275	.06790
20 ÷ .12	.006	.06790
20 ÷ .11	.0055	.07440
20 ÷ .13	.065	.13940
18 ÷ .80	.0444	.18800

5/12 × 20 × 2.987 =	24.89
1/2 × 20 × 1.967 =	19.67
1/2 × 20 × 1.945	19.45
1/2 × 20 × 1.915	19.15
1/2 × 20 × 1.882	18.82
1/2 × 20 × 1.837	18.37
1/4 × 20 × 1.75	8.79
1/12 × 19 × 1.35	2.1375
	121.2775 Volt-Amp hours

121.2775 Volt amp hours

25 Discharge on Constant Current.

	Efficiency
1.975 ÷ 2.03	.9729
1.96 ÷ 2.02	.971
1.93 ÷ 2.01	.961
1.90 ÷ 1.99	.954
1.865 ÷ 1.97	.947
1.81 ÷ 1.93	.938
out	
1.81 ÷ 1.92	.942
1.69 ÷ 1.82	.929
1.00 ÷ 1.80	.556

Time	Current	Closed E	Open EMF
3.20	20 Amp	2.08	
3.45	20	1.975	2.03
4.15	20 –	1.96	2.02
4.45	20 –	1.93	2.01
5.15	20 –	1.90	1.99
5.45	20 –	1.865	1.97
6.15	20 –	1.81	1.93
6.30	Out		
7.55 on	22		2.02
8.00	20.2	1.87	1.92
8.15	20.	1.69	1.82
8.20	18.	1.	1.80
	71.6 AH	–	–

"

Charging	9.30	10 Amp	2.1V.
	10.30	10 –	2.19
	11.45	10 –	2.20
	1.00	10 –	
	2.30	10 –	2.25
	3.30	10 –	2.27
	6.45	–	2.5

34.7	× 1/12	=	2.89	
34.3	× 1/4	=	8.58	11.47
34	× 1/4	=	8.50	19.97
33.2	× 1/2	=	16.60	36.67
32.15	× 1/4	=	8.03	44.69
30.85	× 1/4	=	7.71	52.40
27.15	× 1/4	=	6.79	59.19
				Cut
20.05	× 1/4	=	5.01	64.20
15	× 1/4	=	3.75	67.95
12.75	× 1/8	=	3.19	71.14
11.4	× 1/4	=	2.85	73.99
10.0	× 1/3	=	3.33	77.32
8.85	× 1/6	=	1.48	78.80

2.89	× 1.95	= 5.64	
8.58	× 1.94	16.64	22.28
8.50	1.92	16.3	38.38
16.60	1.875	31.6	69.98
8.02	1.875	14.88	84.86
7.71	1.74	14.12	98.98
6.79	1.52	10.32	109.30
5.01	1.125	5.64	
3.75	.8225	3.0825	
3.19	.715	2.34	
2.85	.6325	1.80	
3.33	.555	1.89	

~~124.1525~~ voltage drop

2nd Discharge on Constant Resistance

.10 ÷ 34.4	=	.002
.12 ÷ 34.2		.0035
.12 ÷ 33.8		.0035
.14 ÷ 32.6		.0043
.16 ÷ 31.7		.00505
.20 ÷ 30.0		.00608
.45 ÷ 24.3		.0188

Ohms

2nd Discharge. Constant Resistance.

	Efficiency
1.95 ÷ 2.05	.952
1.93 ÷ 2.05	.943
1.92 ÷ 2.03	.942
1.84 ÷ 1.98	.929
1.79 ÷ 1.95	.917
1.69 ÷ 1.89	.895
1.35 ÷ 1.80	.751

2nd

Discharge on constant resistance.

3.10	35 Amps	1.95	
3.15	34.4	1.95	2.05
3.30	34.2	1.93	2.05
3.45	33.8	1.91	2.03
4.15	32.6	1.84	1.95
4.30	31.7	1.79	1.95
4.45	30.0	1.69	1.89
5.00	24.3	1.35	1.80
5.15	16.4	.90	1.53
5.30	13.6	.755	1.20
5.45	11.9	.665	1.20
6.00	10.9	.60	1.18
6.20	9.1	.51	1.15
6.30	8.6	out	

On Charging 10 amps at 6.35 Rate 8.75

49 45 × 1 1/2
465
955
4775

8/60 47.75 =	6.366 × 1.945 =	12.316
8/60 46.45 =	3.090 × 1.935	6.15
8/60 46.35 =	2.317 × 1.9275	4.465
1/12 46.10 =	3.841 × 1.92	7.465
1/12 45.75 =	3.812 × 1.91	7.39
1/12 45.45 =	3.787 × 1.8925	7.19
1/12 45.05 =	3.754 × 1.88	7.06
1/12 44.65 =	3.720 × 1.865	6.94
1/12 44.25 =	3.695 × 1.855	6.86
1/12 43.95 =	3.662 × 1.835	6.725
1/12 43.60 =	3.616 × 1.8125	6.55
1/12 42.80 =	3.566 × 1.79	6.38
1/12 42.0 =	3.500 × 1.7525	6.13
1/12 40.95 =	3.412 × 1.70	5.795
	52.134 Amp hrs.	97.350 watt hours

3rd Discharge. Constant Resistance.

	Efficiency.
1.94 ÷ 2.09	.928
1.93 ÷ 2.08	.927
1.925 ÷ 2.07	.929
1.915 ÷ 2.07	.925
1.905 ÷ 2.05	.929
1.89 ÷ 2.04	.926
1.87 ÷ 2.03	.922
1.86 ÷ 2.02	.921
1.85 ÷ 2.01	.921
1.82 ÷ 1.99	.914
1.805 ÷ 2.00	.902
1.775 ÷ 1.93	.929
1.73 ÷ 1.84	.939
1.67 ÷ 1.80	.927

3rd Discharge through Constant Resistance

5 ÷ 46.5	=	.00322
5 ÷ 46.4		.00324
45 ÷ 46.3		.00313
155 ÷ 45.9		.00338
155 ÷ 45.6		.00340
5 ÷ 45.3		.00331
16 ÷ 44.8		.00357
16 ÷ 44.5		.00360
16 ÷ 44.2		.00362
17 ÷ 43.7		.00379
195 ÷ 43.1		.00452
155 ÷ 42.5		.00365
11 ÷ 41.5		.00265
13 ÷ 40.4		.00324

Ohms.

Discharge through
constant resistance

11.00	49. Amp	1.95	Ohm
11.05	46.5	1.94	2.09
11.12	46.4	1.93	2.08
11.15	46.3	1.925	2.07
11.20	45.9	1.915	2.07
11.25	45.6	1.905	2.05
11.30	45.3	1.89	2.04
11.35	44.8	1.87	2.03
11.40	44.5	1.86	2.02
11.45	44.2	1.85	2.01
11.50	43.7	1.82	1.99
11.55	43.1	1.805	2.00
12.00	42.5	1.775	1.98
12.0[illegible]	[illegible].5	1.73	1.84
12.[illegible]	40.4	1.67	1.80
~~[illegible]~~	~~[illegible]~~		
[illegible]	46		
1.43	42.8	1.76	1.94
1.50	38.3	1.79	1.89
1.58	31.2	1.07	1.80
2.[illegible]	22.0	.90	1.40

[ITEM FOUND IN BOOK]

2.2 Cc Cl — 16 plates $\frac{7}{8}$ inch and $\frac{1}{8}$ [illegible],

4 X 8 [illegible] plates —

Little plates 2.81 sqr inches $\frac{5}{32}$ thick

holds 15 grammes metallic Hg + / 3 grammes

metallic iron in other plate —

2.25
1.25
125
950
95

3.8125

[ITEM FOUND IN BOOK]

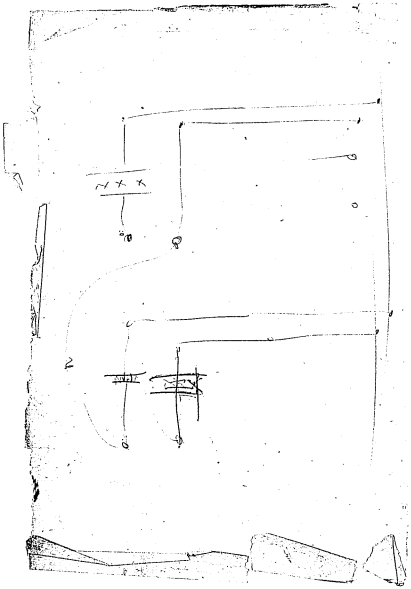
Di I and To: VI

- Spec 1475
Current Clear Spec

9.15	6.3	1.25	
9.16	6.1	1.22	
9.17	5.90	1.16	1.28
9.20	4.35	.84	1.24
9.25	3.68	.715	1.18
9.30	3.40	.65	1.15
9.35	3.1	.60	1.10
9.40	3.05	.58	1.10
9.45	2.9	.56	1.10
9.50	2.85	.54	1.08
9.55	2.75	.53	1.08
10.00	2.70	.51	1.08
10.05	2.60	.50	1.06
10.10	2.55	.49	1.06
10.25	2.4	.46	1.04
10.40			

171
555

[ITEM FOUND IN BOOK]



Notebook, N-99-00-00.3

N-(99-00-003)

Experimental — Mi-
Battery.

Essential for the Operation of such cell is an accumulation of the following three conditions. —

1). That the Amin in question is a conductor.

2) That it does not discolour during electrolysis in either direction.

Zn (OH)$_2$ and any Nickel hydrate

3) That electrolysis between inactive poles does not change the chemical constitution of the said Amin (or — that if a change takes place, the process is reversable

The behaviour of the electrodes in regard to 1 is shown in columns 3 & 4.—

The voltages given are combination of voltage of decomposition of the amines b) gas polarisation c) Resistance drops.

The test regarding 2) is effected by evaporating a filtered sol, that has been in contact with freshly precipitated $Zn(OH)_2$ and noting Residue (Last column)

3) is partially answered in 5, 6, 7

5 & 6 giving estimated percentage of theoretical amount of gas evolved at the probs. —

N°	Name of Amine	Polimerization Conductance 5 Mol. Mol. A. Volts	Amount of Gas Given off in Cubic Centimetres	Remarks on appearance of Gas	Relative Conc.	Remarks
1.	Ethylenediamine	17 mm/h.	IV.	0.	100%	Yellowish-white Amorph. Remains in liquid
2.	Trimethylene Amine.	17.	9.	10%	100%	Bubbles normal. Slight Hardness
3.	Diethylamin	17.	8	10%	100%	" " Remained
4.	Isobutylamin	17.	7.	10%	100%	" " "
5.	Tetramethylene diamin	17.	4½	100%	100%	" " Abundant Zn(OH)₂ Hardly.
6.	Cyanidiamin	17.	4.	Nearly 100%	100%	" " Slight Hardness
7.	Triethylamin	17.	6.	0.	100%	No Reaction i.e. Zn(OH)₂ dissolved.
8.	Tetraethylam Hydroxide					No Reaction

9. Tetrametylamin hydrobr.	17.	4½	40%	100%	Normal ~~[illegible]~~	No Reaction
10. Trietylamin	17.	4½	40%	100%	dark brown dyes	No Reaction on test probe
11. Tetraetylo-ammonium hydroxyd	17.	4½	30%	100%	Normal	No Reaction
12. Tetrametylo-ammonium hydroxyd	17.	4½	20%	100%	Normal	No Reaction
13. Tetraetylo-ammonium hydroxyd	17.	3.	10%	0%	Strong dyeing — probe	No Reaction
14. Diallylamin	17.	6.	10%	100%		Reaction
15. Triallylamin	17.	4.	10%	100%	Strong dyeing on test probe	Very slight Reaction
16. Benzylamin	17.	9.	5%	100%	Normal	No Reaction

Protokoll über die Sitzung vom [illegible]

[illegible] Herr Dr. [illegible]

2. Fall.

Nickel hydroxydhaltige glasige Masse
unfertig. Die Operation sollte ein
organisches Reagenz [illegible], das
auf diesen Niederschlag lösend
einwirkt. Im Grund selbst
ist eine Lösung die vielleicht
Aussicht von einer Verhandlung
sobald altbekannte Lösung [illegible]
in Begleitung [illegible]
N. ist. praecipitat.

17. Fragezeichen 1 4 [illegible]

18. Fragezeichen 1 [illegible]

19. [illegible] 18. [illegible] Normal Strychnin

Compatibel.

Ethylene diamine

18.5. V.5.1. 1

Trimethylene diamine

18.5. V.5.8. 2

Butylamine

18.5. V.5.5. 3

Triallylamine

18.5. V.3.1. 4

Tetrallylammonium

18.5. V.2.2. 5

Trimethylorthometylenamin

18.5.7. V.4. 6

~~From the~~

No 4 & No 6 [illegible]
with an original density to have
drawn back and reserved for a few
minutes (by mistake) The changing from
appearance of precipitation in the tubes.
As soon as the [illegible] Amber
the coming out of [illegible] from the metal:
hydrate is observed, which [illegible]
is surrounded by flocks of white —
may be [illegible] back from
the [illegible]

4) Triallylamin — 5) Tetrallylammon.
6) Trimethylorthometylenamin

[illegible] current during
24 hours pro ozone out [illegible]
[illegible] 10 m/A. —
[illegible] 1" + 1/4" [illegible]
96 % [illegible] [illegible]
[illegible] [illegible] crystallizes.
[illegible] 25 m/A. [illegible]
[illegible]
[illegible] 2 hours [illegible]
Solution 10 % [illegible]
[illegible] hours [illegible]
[illegible] Veränderungen
[illegible]

Stria severit. — [illegible]
[illegible], [illegible] [illegible]

Following Solutions tested
with Pt. Electrodes. [illegible]
10 m/A. current
Tension.

Trimethylcarbinylamin
V. B. S. about 10 % O at + pole

Triethylamine
5 % at + V. B. S.

Tetraethylamin O.H. 10 % O at
+. Some heavy, spongy deposits

Isobutylamin very little gas
V. b. o.

Przepylanie
Forma [illegible] + [illegible] V. 4. 3.

Przekładanie
[illegible] V. 3. 1.

Czyszczenie.
+ 80% O. V. 3. 8.

[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

Agat Bragas

I Angewandt 1.920

" 1.900

Sodium Carb. 8g

mit Zusatz

Vit. Siegel 24.833.

Amk Sio 2. 25.850

1.017

Nanios + Sio2: 46 28 28 32 / 48 / 122 : 60

1.017 : 1.9 = x : 100

1.017,0 : 1.9 . 53.50.

95 / 67 / 57 / 10,95

Pt Tiegel mit Eisen & Aluminiumoxyd

25.08.
24.833
.247

$Al_2O_3 + Fe_2O_3$

Porzellan Tiegel mit Deckel.

mit 16.020.
Mn S. 16.100
.080

0.07 : 1.92 = x : 100

1.92 : 4.22 = 100
192
420
384

Mn = 0

4.2 : Mn O
4.01 : Al_2O_3
.02 : Al_2O_3
50 : 5
5 : 02

Mn O 0.099
Al_2O_3 0.077
.5.
As_2O_3 .163
Fe_2O_3 .84
Al_2O_3 1.017
1.255

.099
75
163
1.017
1.004 Mn O

Porzellan Tiegel mit Deckel

17.868
mit $Sn_2 - As$ 17.950

Sn S. .082
.070
nach dem glühen 17.945.

$As_2Sn_2S_3$ .005.

Pt. mit Fe_2O_3. 24.996.
24.833
.163

.247.
.163
Al_2O_3 .084

$Al_2 S_2 : Al_2O_3$ 0.21%

0.005 : 1.9005 : x : 100
.500 : 100 = 0.02

0.077 : 1.92 = x : 100
3.70 : 1.92 = 4.00 : Sn

3.68

2 Fe_2O_3 : 4 Fe_2SiO_4

53.5 SiO_2.

.163 : 1.9 = x : 100

2 Fe_2O_3 : 4 Fe_2SiO_4 = 0.163 : x

0.245 : 192 = x : 100 = 127.98 % Silicat of Iron

24.500 : 192 = 5.30 584

4 Fe_2SiO_4 = 0.245 : x

14700 : 480 = 30 240 = 0.245 : x

48 : 282 = 1.017

0.084 : x

0.493 : 192 = x : 100

69.30 : 192 = 25

0.493 : 1.017 = 0.484

0.084 : 1.92 = x : 100

8.40 : 1.92 = 4.40

768 720

Na2O Al2O3 6 SiO2

Al2O3 : 1.92 = x : 100

0.493 : 1.017 = 0.484

2034 8136 2034

28679 : 60 = 0.493 29.580

54440 : 480 = 1.23, ~~Al2O3 6.40~~

Iron lit. cut 11.98

MgO 4.21

CaO 4.01.00

Al2O3 0.02.00

Al_2O_3 4.40 %.

Silicate of Iron 11.98 %.

Manganese oxide 4.21.

Ti oxide 4.01.

Ar_2O_3 0.02 %

~~Arium Silicate~~ — %

99.6 %

Na_2O Al_2O_3 $6SiO_2$

46 28
46 6
56 168
48 32
200

Al Silicate 28.32 %

Iron Silicate 11.98 %

Manganese oxide 4.21 %

Ti oxide 4.01 %

Ar_2O_3 0.02 %

Silicate of Arium 54.30 %

99.84

163 : 1.9 = x : 100

163 : 19 = 8.6

152

110

114

Fe2O3 8.6%

Al2O3 4.44%

SiO2 53.50%

MnO2 4.22%

Al2O3 .044 : 1.9 = x : 100

84 : 19 = 4.44

76

80

76

4

Al2O3 0.01%

MnO2 0.02%

Al2O3

MnO2 0.025%

Notebook, N-01-04-30

Melting pt of

Cd	608°F.
Zn	775 788
Sb	842

Bi (108)	515
Sn (220)	496
Pb 330-335	697

Sn	496
Bi	515
Cd	608
Pb	697
Zn	780
Sb	842

Apr 30th 1907

Experiments on making active iron oxide for Storage battery.

Previous Exp. are recorded together with the results of the electrical tests of corresponding grids.

Apr 20th

1) 100 g of Fe_2O_3 made from Oxalate of iron by ignition in Drum, plenty of air being passed through same, is kept in stream of H for 1¼ hour at 700 - 800°F. The drum is turned at intervals.

After heat is worked down, H is passed for 4 hours.

Appearance: greyish.

All magnetic.

Bud:

Apr. 20th No. 2

Same material as No. I

reject in H for 1½ at 650-700

and for 10 hours after cooling

down

Appearance black than I

Grey I

Same most as before

1½ in H at 650-700 for only -

little higher. black

(Sooderne tunnel.)

May 2nd. IV

10g Fe_2O_3 from Oxalate.

Start 1030.

Temp at 1032 :: 665 F°
(by asymptotic method)

" " 10.45 645°.

11.15 635°

Stop: 11.30

Ex. Curve

Run long excess all the time. Cooled fast and kept run 14 for 7½h (little perjophoric)

[9]

May 3rd

V

30g Feids from asbestos.
and one grid ~~passed~~
of same stuff.

Start	10 50	550°F
	11 00	570
	11 00	600
	1200	- - - same
	1205	Blown out
	1210	520°

Opened for cooling.
Bird repressed at 4 hrs 5 min 100 Atm. (376)

[illegible]

May 6th

Run VI

500g Fe_2O_3 from oxalate

Temp estimated to 800° – 900°

1¼ hours. and in H for 4h.

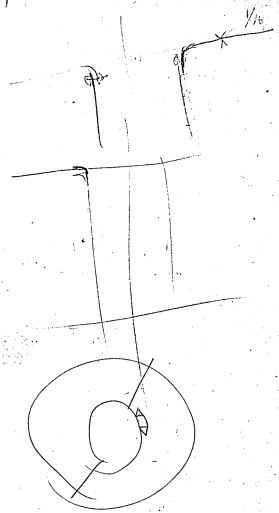
Gas regulator loaded with 1lb. weights hanging by some.

Little gas jet for regulating flow of H at a certain position which is to be maintained.

Dead block and fire.

Porcelain shows high amount of

(13) Fe metal



May 7th

Run VII

Temp between 775 and 892 °F

50g. Fe$_2$O$_3$ from Apatite.

Same pressure and opening as in VI

1¼ h and 15 h in H

Divided into two parts one gray (VII a) near inlet and one black (VII) near exit.

Lots of iron in gray part (proved by Browning)

A		B
1 7.257	boat	7.387
2 8.445	loaded	8.682
3 8.260	Reduced	8.480 —
4 8.637	oxidized	9.893

The reduced was got slightly oxidized before weighing. B was oxidized probably only Fe_3O_4 or intermediate between same and Fe_2O_3 was reduced so this may get three results

considering the reduced stuff Fe

" " oxidized Fe_2O_3

Fe_3O_4

A

1 Fe_5O_6

2 Fe_5O_7

3 Fe_5O_8

B. 1) Fe_8O_5

2) Fe_8O_7

3) $Fe_{10}O_8$

Fe_5O_3 as average

$2 Fe_2O + FeO$

VIII May 8th

Fe_2O_3 from Oxalate by heating in closed vessel gives of 1/4 O_2 and is magnetic

IX May 8th

(Oxalate contains 25% H_2O)

Rg. Oxalate to 1 Rg Fe_2O_3; this is the theoret. proportion for all going into FeO, as FeC_2O_4 decomposes into Fe and $2CO_2$.

$$Fe_2O_3 + FeC_2O_4 = 2FeO + FeO + 2(CO_2)$$

Fire block after heating in glass tube ~~at~~ point of decomposition and leaving in it for 12 hours.

Bromine shows no trace after.

X

$3\,Fe_2O_3 + 1\,FeCO_3$

$= 2\,Fe_3O_4 + FeO + 2CO_2$

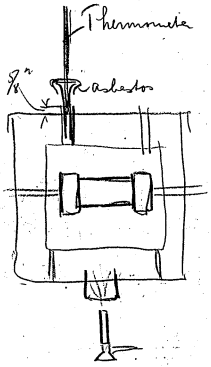
2g Oxalate (mount) to 5g Fe_2O_3

May 9th

Run XI

Duplicate of V,

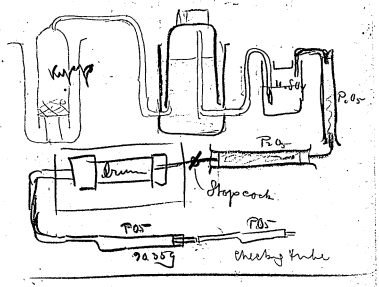
that oxidized in air.



May 4th Run VII

Weight of Phosphorus anhydride tube: 90.35 g, of checking tube 75.87

Arrangement



934	78	300° on edge
42	120	
44		220
46	210	
48		360
52	222	
54.20		420
50	266	
10-00 10		480
55		460
1 55		500
5 25	224	
5 55	272	
6 18	268	
7 00	262	
20	64	
8 55		380
52		420
9 8		450
9 50		500
10 12		520
10 58		540
11 17		580
11 57		60
12 50		20
7070		87
10 00		92
95		53
10 1375		600

1018 45	302	
19 15	300	
20 15	290	
24 45	220	
25 45	276	
10 3010	270	Plume increased
10.42	Weight of tube 91.20	
1048	380	
mg of Zn		
10 50	342	
11 00	362	Weight 92.85
11 10	370	Count 96.00
11 19	384	W = 93.55
20	52	
25	64	
32	78	94.45
45	60	Small [illegible]
55	352	3 3595 94.70
		3 3 95.6
1200	354	

Expressed and H Stoller

Work total

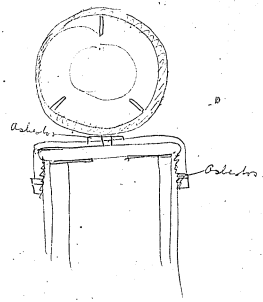
$$98.6 - 90.35 = 5.25$$
$$36.3 - 35.85 = .45$$
$$5.70g$$

Theoret : 5.62g

9 / 18.5	Fe_2O_3 — 110	5.62g
11	160 — 18	
8	56 — 1	
4.5 / 8		

Taken out at 10 am
using 10 hr (9 hours)

Just parts XII & XII A
, A being a little more
intensive block



May 10. Run XIII

50g of norwegian thermite
ground to 200 mesh size
and roasted well

Drum and load heated till
300°F and air blown through
to drive off moisture
(drum possibly not pollowed
thermometer and consequently
eventually some moisture left)
Started Heat 11 a.m. 200°F on
thermometer in 5/8" position
Weight of anhydrous hole
158.5 g
Electrode holding thermom. broke
in reason of moisture.
Zinc melts at 281 on mm

Quite. — 282 at 11.50

1120 —
1150 282 upon
55 90

Zn must have melted by
burning on combed wooden
copper box, as a piece so
thick left suspended in
the middle of box.

9200 2 gs Zinc gone

1205 weight 161.5
1210 300 [illegible]
1220 303
weight 163.5

Off 1225 163.5
158.5
5.0

May 11th - Run XIV

50 g Norway Magnetite fr 200 mesh and washed.

$Fe_3O_4 = Fe_3O_3 + O$

232 = 216 + 16

232 : 16 = 50 · x , x = $\frac{16 \times 50}{232}$ =

3.45 g O or

3.27 g H_2O

130 — Slow current of air passed through hot Porcelain tube started at 350 for 15 min.

180 — 380° " started

Weight of tube 185.78

155	530°
156	560
170	570

Furnace lifted to 7½ position

1.58 345
58-30 20
2 00 280
01 67
62 30 ~~64~~
2 04 30 66
2 20 ~ 30 mpo Fm (725)
25 Weight 157 g.
~~157.5~~

Phosphorus tube stopped up and H with this partially escaped through leaks. —

$2Cr_2O_3 + 3Fe_2O + 5O_2 = 4Cr_2O_3 + 8.5g\ H_2O$

Run XV

85g magnetite 200 mesh.
Air blown through till
328° ~~0F~~ - H started at
457 328° at 5/3 pressure
Weight of tube at start 147.85g.
5.20 328
Weight 150.2
5.32 338° 151.7
5.50 380 153.7 (6g)
Tube broke —
Left on 5 more mins
acid opened. —

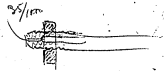
May 12 XVI

Nickel oxyde

20g heated in bulb
and dried in current of
air
It started at 10 ½ [illegible]
Weight of tube
38.7 [illegible]

38.8 [illegible]
at 5 [illegible]

9 11 45	320
1300	340
1340	350
1 55	380
5	400
1700	450
1720	480
21	500
22	350
22 20	320
23	300
32	290
50	280
24 25	270
25 15	260
30 00	250



according to curve Zn will melt at 292 - 290

May 13th XVII

Nickel oxide (catalyst) 50g in airtight burette (improved inlet)

The oxide contains very little moisture - about .25g in 20g.

Burette heated. Still 600 and air passed through to dry oxide

Start 193 ~~Acc~~ weight of tube (93.9g.

Temp 242

9 55 282

10 10 Zn gone at 295°

at 10.15 Phosphorus tube sealed and in ~~weighs~~ crucible - weight 4.5g (cf 5.5 Mentioned

57 + 16 = 25
150 — 16
50 — 5.33

Therefore continued till 10.22, when heat is withdrawn and Room exposed.

A 7268
B 06

112
A 1/3
$\frac{1}{360}$

May 14th

Run XVIII

50 g. of Sub-carbonate of Iron (very little carbonate) that after ignition weighed 30 ozs. less

Weight of Calcined 188.75
" " P_2O_5 " 75.15 g

50 g. of Sub-carbonate
40 g. Fe_2O_3
which by reduction to

Fe_2O gives off
$Fe_2O_3 = Fe_2O + O_2$
160 / 20 40

50 g : 19 g
40 g = 8 g
or 9 g H₂O

[43]

Reaction shows no
action — heavy
no iron at all — heavy

Analysis of Product

Weight of boat 7.254
loss 9.886
Reduced 9.08.

1.826 Ti ; .596 O

Ratio : 3.75

Nearest to TiO with
little Fe_2O_4

Y00 – 4.53
Y10 9.5 – Y0
Y00 9.7 – 00
500 9.9 – 05
500 9 – 11 45
510 11 52
60 12 86
80 13 05
90 13 20

2 70 18 —
– 80 18 20
2 30 – 25
2 05 – 7.30 – 00 on
220 10.75

or 1825 cce. 182.6
PbO_2 75.17

Increase on Mg

11.15 222 188.3 g
75.20
11.45 189.85
182.75
6.70

Run Nickel with excess of iron, keep current constant at 150 m/A and read E and θ. Then charge same at 150 m/A and read volts and estimate rate of growing.

Same for iron.

By running for the Ni – first 1 hr short at and discharge – then 3 hours growing – after some point is reached and discharge and it lost 7 hours after start of growing and discharge – the loss by growing will be determined and at the same time the most favorable point for cutting out.

XLV count : C 175.5

4.35	213	164.2
40	220	
45	214	
5 35	218	168.5
5.55	224	169.2
6 20	222	173.8 ?
6 30	40	
6.55		174.8

cut off

Drum is not perfectly tight –

Average Temp 815° C

Left in H over night, –

but cooled quickly. Or –

is general correction off

XLV (duplicated)

100 g. Fe_2O_3 from Oxalate

Weight of $CaCl_2$ 144.8 g.
1 8.75
163.55 g.

Sn melts at 152

Bi	–	70.
Cd	–	84.
Pb	–	93.
Zn	–	210.

Start 10.25 – 216.
25 – 14.
45 – 13
50 – 25.
55 – 23.
11 – 29. – 147.5
05 – 18.
10 – 16.
15 – 29
20 – 33.
25 – 35.
30 – 33. – 149.5
35 – 32
40 – 30.
45 – 27.
50 – 26.
55 – 23.

12.00 am. - 225 - 151.2
05 — 21.
10 — 20.
15 — 20.
20 — 20.
25 — 24.
30 — 26. - 152.3
35 — 19.
40 — 25
45 — 31
50 — 30
7 — 35. 158.5

10 — 30
30 — 30 155.6
50 — 2 25 = 156.5
7.05 55 — 27.
158.2 — 2 — 28. (129.25)
-145.25 — 05 — 27.
10 — 30.
20 — 31.
25 — 31.
30 — 32 - 139.5
40 — 32.
47 — 26.
55 — 28.
8 — 32. 142.5

3.10 — 240.
20 — 41.
30 — 26 - 143.6
35 — 35.
45 — 30
50 — 30 - 145.1

Off

* 628 & 629

XLVI Feb. 1909

109 from order

Weight of KOH 192.2
13
205.3

8.00 — ~ 600° — 205.3
8.15 ~ 600 (1200
8.35 ~ 178 193.3
9.30 174 192.65
10.10 202
10.30 220 cd
12.15 230 198.5
1.15 236

Ammonia 1.

XLVII

Ammonia

Weight of KOH — 199.3 gr.
9.35
Cd. melts at 183, 208.65

Start 7.30 — 191.
40 — 93.
45 — 90
50 — 89
55 — 88
8. — — 89.
10 — 89.
20 — 87
30 — 83 — 199.65
40 — 82
50 — 90.
9. — — 92.
10 — 92.
20 — 90.
30 — 92 — 201.8
40 — 99
50 — 200
10. — — 200
10 — 200.
20 — 02
30 — 04 — 202.25

Continued 10.40 - 204
50 - 196
11. - - 93
10 - 92.
20 - 85.
30 - 80 - 202.6
40 - 85
50 - 96
P.M. 12. - - 203
10 - 08
20 - 11.
30 - 11. 203.7
40 - 12.
50 - 12.
1. - - 15.
10 - 12.
20 - 13.
30 - 13. - 204.0
40 - 14.
50 - 14.
2. - - 15.
10 - 15.
20 - 15.
30 - 15 - 204.7
40 - 16
50 - 17
3. - - 18

Continued 3.10 - 218.
20 - 20.
30 - 22 - 205.2
40 - 23
50 - 24
4. - - 25
10 - 25
20 - 25
30 - 23 - 205.5
40 - 24
50 - 23
5. - - 23.
10 - 25.
20 - 26.
30 - 28 - 205.8
40 - 28
50 - 28
6. - - 25
6.30 - 20
40 - 17 - 206.8
50 - 17
7. - - 16.
10 - 17.
20 - 16
30 - 15 - 206.8
40 - 14
45 - 14
55 - 14 - 207.
8. -

Continued 8.10 – 214.
20 – 14.
30 – 08 – 207.
9 00 – 10 –
9 20 – 10 207
9 35 – 16 out

$3 \times Fe_2O_3$ — 25 — 112

$2 \times Fe_3O_4$ — 232

$3 \times FeO$

32.0 — 25

304 — 23.8

80 — 6.25 g

$O_2 = 6.25$

$CO_2 = \frac{44}{32} \times 6.25 = 8.6\,g$

8.6 g CO_2 ($5\,FeO$)

XLVIII. June 19th.

25 gr. Fe_2O_3

Weight of KOH 262.5
8.6
271.1

Start 10.10 – 227 (8 out 225)
20 – 23
30 – 26
40 – 26
50 – 26
11. – – 28 – 263.4
10 – 26
20 – 22
30 – 11.
40 – 17.
50 – 24.
12. – – 25 – 265.
10 – 26.
20 – 26.
30 – 26.
40 – 28.
50 – 28.
1. – Out. – 29 – 265.5
10 – 30
20 – 30
30 – 30

Cont. 1.40	–	2.31.	
50	–	31.	
2. –	–	31	– 2 66.1
10	–	32	
20	–	33	
30	–	34	
40	–	34	
50	–	29	– 2 66.5
3. –	–	27	
10	–	26.	
20	–	25.	
30	–	24.	
40	–	27.	
50	–	30	– 2 66.8
4. –	–	30	
10	–	30.	
15	–	30.	
30	–	32.	
40	–	32.	
50	–	32.	
5. –	–	35	– 267.2
10	–	37	
20	–	37	
30	–	37	
40	–	37	
50	–	32.	
6. –	–	26.	– 268.0
30	–	27	
40	–	27	
50	–	27	

~~Mont air 3275~~

" " 325

Fe alone ~~270~~ 280

Fe Ni ~~275~~ 141

Fe liquid 268

Ni alone

Ni liquid ~~3~~275

Cont. 7. –		27	268.3
10	–	30	
20	–	31	
30	–	30	– 268.5
10		28	269.
12 –		36	269.4
2 –		36	273

May 25th Ni 325
Fe 350

Charging test

9.20	1.16 V	156 Ta.	
27	132		
9.45	149	153	
1000	152	145	
1016	157		
1032	155		
1045	155	148	First trace of gas on st.
11 00	156	155	Trace of gas on trace. Ni chart some gas. say 1/25
1115	156	150 200 Ta	Ni 1/16, Fe trace
11 30	155	147 200 Ta	

This is about half charge for Ni. Fe gives at the rate about 1/7 - 1/8 of total opening. For handling 1/50 - 1/20th.

1145	157	150	Ni 1/4
1200	140		
1 00			
1 30	161 V.	145 A	Ni 2/3 Fe very [illegible]
145	155	155	
200	166	140	Ni 3/4 - 1
2 20	169	158 600 Ta	Ni fill not the 1/4

[178]

Continued

Time	Volts	Current	Rate of Growing
~~2.00~~			
2.25	169	146	
2.43	172	151	
2.55	170	170	
3.20	176	177	Bulb full rate.
3.45	176	165	
4.00	176	159	

$3Fe_2O_3 = 480$ | 16
$2Fe_3O_4 = 464$

168
504
232
464

$2Fe_3O_4 = 3Fe_2O + 5O$

$5O = 80$

$480 : 80$ $\quad 80 \div 4.6 = 8$

$80 : x$ $\quad C = 12$

$x = 4.6$ g

$\frac{44}{32} \times 4.6 =$

336 480 · 80
50
8.3

6.88 g CO_2

24
6.88
24.88

June 20th XLIX

30c of isolate Fe heated carefully so as to prevent conglomeration during ignition. Heated to 280° (850°) passing air, hydrogen was started when Temp at 285°.

CO from $K_2Fe(CN)_6$ and H_2SO_4 dried over KOH and CO_2 formed by reduction of oxide absorbed by KOH

Start : 5.30 2.35°

Weight ~~of Cl~~ KOH Wt 2g
2.48.8

8.30	3.20°	2462	
4	16		
9	30	247.4	
15	24		
25	30	248.4	
35	36		
45	40	248.8	
50			

Off

Fe2O3 = 160 | 32
Fe2O =

160 - 32
20 - x x = 6g.

6.2 gms

I. June 21st

2 g. of oxalate of Fe.

To be dissolved of 2g of CO_2 (corresponding to start Fe2O3)

Weight of KOH 2.48.8 g.
2.51.5

Start at 1.00 P.M.	2.35°
10	48
20	52
30	50 - 250.6
40	47
45	47 - 252.0

Off

I I. June 22nd.

Temp. of Thermometer in [redacted] A

Height of [redacted] Cellr 252.2

258.9

Start 2.10 - 180.
15 - 220.
20 - 52.
30 - 06.
35 - 11.
40 - 14.
45 - 18.
50 - 12.
55 - 12:
3. - 08 - 253.7
08 - 02.
15 - 10.
25 - 13. 254.6
30 - 13
38 - 14.
48 - 08
4. - 12 - 255.15
10 - 10
20 - 09
30 - 02 - 255.5
40 - 00

To loose 6.7 g Hrs.

Conversion of amperitys upon the mean 6.7 is about 1.6 g

4.50 - 316
5. - - 32 - 255.9
10 - 52.
20 - 57
30 - 66 - 256.9
40 - 54
50 - 53
6. - - 51 - 257.9
10 - 52
20 - 57
30 - 56 - 258.7
7. - - 54. 259.9

Off.

June · 22nd

411

145 – 150 g of Fe O
from Axolotl by
oxalic roasting bel
red heat in by
heated to about
in slow current
chlorine – air (to reduce
it to Fe_2O_3) and
then reduced in
H at a temp
between Zn & Sb.
This should be a

Analysis of our
best runs, 21, 43, 45

Weight of K_2O_4 [illegible] 7 g.
2.7. –
Zn at 242. 8.6.7

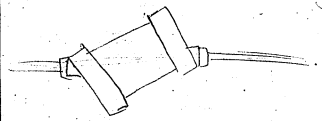
Start 11.00 – 252.
20 – 56.
30 – 56 – 266
Start again 11.45 – 55 – 244.4
12. – – 60.
20 – 61.
30 – 62. 248.4
45 – 65.
1. – – 66 251.2
10 – 68.
20 – 68.
30 – 64 – 254.4
40 – 64
50 – 61.
2. – – 64 – 256.2
10 – 61.
20 – 63.

2.	30	265	258.2
	45	63	
3.	—	72	259.1
	15	64	
	30	70	262.5
	40	70	
	45	64	263.3
	50	70	
4.	—	76	263.5
	10	64	
	20	66	
	30	65	
	45	80	
	50	80	
5.	00	79	264.
	10	82	
	20		
	25	86	264.9

Off

The crop contains big lumps of conglomerate rock. Has been too high or is charge too big. —

Burn must be ~~[illegible]~~ [illegible] and charge must not exceed 120 g.



I. 111. June 24th

100 g. of Ba_2O_3 from Oxalate of Ca.

Weight of $CaCl_2$ 230 g.
19 g. 249 g.

Zn at 294 at 2.55

Start 3.10 – 2.74.
20 – 62.
30 – 74.
40 – 90
50 – 87
4. – – 90 – 236.5
10 – 94
20 – 88
30 – 90
40 – 92.
50 – 94.
5. – – 90 – 238.00
10 – 95
20 – 96
30 – 97
40 – 96
50 – 93

6.00 – 290 – 240.5 g.
10 306
20 ~~303~~
35 318 241.35
45 18
7. – – 18
10 – 34
25 – 16
30 – 06 – 243.9
40 – 15
50 – 14
8.00 – 03 – 245.4
10 – 287
20 – 86
30 – 316 – 246.3
40 – 30
50 – 34.
9.00 – 29 – 247.5
10. – 30
20 – 31
30 – 35 – 249.2

Off!

LIV. June 25th.

100 g. of Fe_2O_3 from Oxalate of Fe.

Weight of Fe_2O_3 - 249.2
21.
270.2

Gas metric at

Start 10.20 - 320
30 - 40
40 - 40
50 - 55
11.00 - 54 - 254.1
10 - 62
20 - 45
30 - 25 - 255.2
40 - 37
50 -
12. - - 32 - 256.1
10 - 38
20 - 47
30 - 58 - 256.4
40 - 57
1. 10 46
30 46 - 253.4

1.45 - 341
2.00 - 45 - 255.3
10 - 45
20 - 38
30 - 44 - 260.5
40 - 45
50 - 50
3.00 - 65 - 264.9
10 - 65
20 - 70
30 - 70 - 263.2
40 - 69
50 - 64
4. - - 69 - 264.5
10 - 68
20 - 62
30 - 75 - 265.5
40 - 70
50 - 72
5. - - 77 - 266.5
10 - 70
20 - 64
30 - 66 - 267.5
40 - 68
50 - 68
6.00 - 55 - 268.5
10 - 48
20 - 65 - 269.0
30 -
45 - 3.70 - 270.-
corr.

I V. July 7th.

1.00 g. of H_2O from Chloralate of K.

Weight of $CaCl_2$ — 2.54 g.

To run at 800°

66.2° at Siemens.

2.54.9
.19
2.73.9 about 800 at elevated Th

5.15	580	66.3
20	79	66.2
25	77	66.1
30	74	
35	72	
40	70	
45	79	~~66.9~~ 66.8
50	79	
55	78	
6.00	74 — 262. g.	
15		65.0
30	600	65.4
40		
45	— above	
55		
7.—		— 2.66.
10	540	
20	40	
7.30	555 — 2.66.2	
40	560	
50	524	
8.—	57	
10	50	
20	600	
25	540.	
30		
35	422	2.64.5
40	509	
55	582.	
9.05		65.6
9.15		65.
30		66.4

Drum dropped up.

July 2nd.

I VI

100g Ferr. from Oxalate.
Weight of ⅓ point in 200g
To be reduced at 800°
All Calc. Auto Increase

18g

181.7	48.5
242	57.9
360	74.6
418	55.9
456	56.4
504	57.9
554	59.
600	59.1
600	61.2

267.7
18
285.7

255		57.8	
348		53.6	66.2
410		55.2	
450	—	56.0	
462	—	57.4	
510	—	58.6	
56	—	0.2	
600	—		

5.10 pm		60.4	
20		60.8	
35	—	61.6	
42	—	64.6	
6.00	—	64.9	
6 15		65.0	
27		66.1	
633		66.6	267.7
50	—	66.6	
7.15		66.0	
20	—	66.-	276.7
50		68.4	
8.05	—	68.0	

Running at regular rate — rate used in all late experiments — the ¾ 1¼ mm to fill through a 70/100 hole a space 4½ from 6" long

This gives a speed through the hole of 28 mm or 90' per second and a rate of 1.32 l per min: and 79.2 l per hour = 21 gall.

For a 6 hours run 126 gall or 475 l.

The theoretical amount is 2.2 g H per 100 g Fe_2O_3 or 25 l = 6.5 gall.

---

475 l = 42 g

H_2SO_4 [illegible] = 2050 g

Zn [illegible]

Costs size of Dewar:

8" diam 8" long — will conveniently hold 120 g. 160 lbs. will require 30" length and 12" diam
24" — — 14" —

8 20 64.5 284.3 (285.7)
8 40 off

800 g's of Zn consumed

24.60 N = 274 l

800 65.2
[illegible]

July 3rd.

LVII 1 oz. of [illegible] carefully rounded Feeds (Lyphomotus ~~Violets~~)

Temp at ca 775 (over ~~exceed~~ above this limit)

Sonna 65.5

9 7°	—	47.6	
10.30	—	48.1	
50	—	61.2	
11. —	—	61.6	
10	—	62.1	
20	—	62.5	
25	—	63.0	
35	—	63.2	
45	—	63.8	
50	—	64.1	
58	—	64.6	
Start 12.08	—	65.1	179
14	—	65.5	197
25	—	65.6	
30	—		
40	—	66.5	182
55		67.4	
1 20		65.2	

1 30		65.4	187.1
1.55		65.4	
2.[illegible]			189.[illegible]
[illegible]		65.0	189.
15		64.7	
[illegible]		65.2	
30		65.4	190.5
40	—	64.4	
45		65.1	
50	—	65.4	
3.00	—	65.6	193.—
10	—	65.1	
18	—	65.2	
30	—	65.1	194.
40	—	65.4	
45	—	65.4	
52	—	65.3	
4.00	—	65.3	194.3
12	—	65.5	196.8
16	—	65.6	
25	—	65.7	197.3

off

Zinc consumed

11.25g = 1.125

July 4th

[VIII]

30g Fe_2O_3 from Oxalate by roasting at low heat.

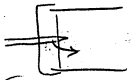
Bromine used in generator

750g of Fe turnings

10.00	42.8	
10.40	64.6	
Start 11.15	65.4	207.6
20	65.4	
30	65.5	
35	65.9	
45	65.3	205.3
12.00	65.1	206.3
12.15	65.1	207.2

Some 400g Fe consumed

Partially – especially near inlet – reduced to metal. This due to heat in pipe and consequent wrong distribution of Br.



The run proves the necessity of a small inlet and a lively circulation of gas.

Lots of PbS formed.

July 4 1.

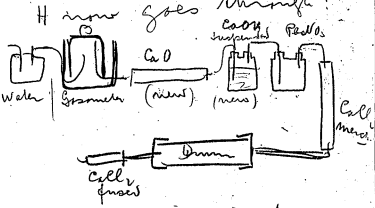
L IX 50g of Some Stuff

Improvements:

Other drum worked perfect

mouthpiece used.

It now goes through:



while Ag_2SO_4 cut out.

It gives plenty of gas.

Product $PbSO_4$ to be used for crystallization and

use — Oxalate process

Results frequent burning of drum the peaks are bunched closely from time to time

4.35	—	(65.5 = 77.5%)
4.45	65.5	
.50	65.5	207.5
5.05	65.9	209
15	65.9	
20	65.7	216.5
40	65.4	
50	65.5	211.7
6.00	65.4	212.7
6.25	65.5	214.4
35	65.5	
45	65.7	215.5
7.00	65.7	216.8

Anode exposed while it was allowed to flow slowly.

Product in small soft lumps. - apparently homogeneous

LX. July 5th 1898

50 g. $K_2C_2O_4$ from Oxalate to be reduced in at 65 (750 cc) in same way as 45 (9.3 g Mg)

Start 4.55 - 65.0 - 220.0
16.18 - 64.5 (229.0)

Same conditions as last run - only not shaken as well during rise of temp before start of 60	2.0	65.2	
	3.3	65.0	
	4.3	64.9	
	5.5	64.8	
		64.7	
	11.05		221.5
Rate rather slow	11.35	65.9	222.8
	11.45	65.4	
	12.00	65.2	225
H_2SO_4: 10% used (and 750 g Fe. brought)	12.25	65.2	225.5
	12.45	65.2	
	12.55	65.4	227.
H_2SO_4 and Fe added after	1.15	65	228.1
	1.40	64.8	228.7
	2.05		229.1

In addition to earlier cleaning devices (H_2O, CaO_2, CaO Reflux and $CaCl_2$) we now moved a bottle containing $KClO + KOH$ to run over P_2O_5. Some may combine with H_2O from P_2O and KCl. especially by action of light

I × 1. July 6th 1895

60 g. Fe2 O3 from Oxalate

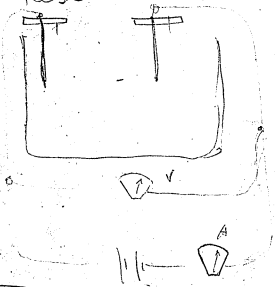
Weight of $CaCl_2$ 228.4
15
243

Start 11.05 – 64.3
15 – 64.5
22 – 64.6
25 – 65.–
32 – 65.–
40 – 64.8
45 – 64.7
12.00 – 64.7 – 233.7
10 – 64.5
20 – 64.7
30 – 64.8
45 – 65.4
55 – 65.2
1.00 – 65.3 – 237.7
15 – 65.1
25 – 65.1
35 – 65.1
52 – 65.1
2.00 – 65.2 – 240.5
10 – 65.4
25 – 65.7
30 – 65.8 – 241.7

See next page

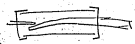
Weight of Fe2 O3 from Fe2 (C2 O4)3

Resistance



2.40 – 65.0
50 – 65.0
3.– – 65.0 – 242.9

2 impressed Drum



At 3" apart (Wi 424-425

100 ma/A	1.1	Rem	.75
200	1.92		.21
	mp 1.8		
300	.32		— —
400	.39		
500	.57		

3"	150	.32	35
2"		2.15	
1"		185	
3/4		.175	1.0

at 150 Amp.
Wi.

Brown 370 – 375

100	2.5	
200	.41	4.3.
300	.57	

Bosing –

100	27	16-yoto 26
150	35	
250	52	

Re after Recharging and discharging 300 mAH

150 ma/A	.3 V	!!
250	.44	
750	.55	rem 42-mp-15

May 19th

Charging test.

UCi 400, Ic 327

fully discharged

845	150 mg/A	1.28	
900		137	
915		1.43	75 mg/A H
930		144	
945		147	
1000		148	155 NH4
1005		149	205
1030		150	
1055		151	300 mg/A H. going slightly
1100		151	
1115		151	1/10th V/S going
1130		152	
1145		1525	V/S going
1200		1535	below V/S
1215		1545	
1230		1555	
1245		157	nearly full
100		158	
115		159	
fully charged		160	

LXII July 9th.

50 g. Fe_2O_3 from Oxalate

Weight of $CaCl_2$ = 243.5 g.
9.3

Start	10.40 –	64.5 – 252.8
	50 –	64.7
to lose 9.3 H_2O	11.00 –	64.7
	10 –	64.8
Cost iron Dummy	20 –	64.9
	25 –	64.8
	40 –	64.7 – 247.1
Dummy CaO, $Ca(OH)_2$, $(Fe_2O_3, Cu(OH)_2$ compound) and $CaCl_2$	50 –	64.7
	12.00 –	64.5
improved Dummy.	10 –	64.6
	40 –	65.9
	50 –	65.8
	1.00 –	65.8 – 248.0
Cal. tube is good.	20 –	65.4
	30 –	65.1
	40 –	65.0
	50 –	65.0
	2.00 –	64.7
~~Not tube (pothos. hydrate)~~	20 –	64.7 – 211.9

From a certain point the weight of the bulb does not further increase. It appears to be some oily matter in some condensed hydrocarbon? – These may prevent further absorption of CO_2.

LXIII 50 g Fe_2O_3 from oxalate

Kali used for absorbing CO_2 = 211.9
1.3

Start	4.40 –	64.5 – 221.2
	– 50 –	64.5
	5.00 –	64.5
	10 –	64.1
	20 –	64.3
	27 –	64.5
	35 –	64.4
	40 –	64.9 – 215.0
	50 –	65.0
	6.00 –	64.9
	10 –	65.0
	40 –	66.0 – 216.6
	50 –	65.5
	7.00 –	65.2
	15 –	65.5
	22 –	65.4

Cont. 7.30 - 65.6
40 - 65.8 - 219.5
50 - 65.0
8.00 - 65.0 -
10 - 64.7 - 220.6
20 - 64.6
30 - 64.4
35 - " 221.1

Off.

LXIII. July 10th.

50 g. $KClO_3$ from Oxalate
Weight of KOH 222.7 g.
9.3
232.0

Start 11.10 - 64.8
20 - 64.4
11 50 - 65.6 - 223.7
12 15 - 65.6
35 - 65.4 - 229.1
1 30 - 65. - 231.6
65.9
200 - 65 - 232.1

Off

This time an iron pipe (⅜") is inserted between Cell and Drum and heated by bright red heat, whereby some of the hydrocarbons are supposed to be decomposed.

LXV. July 11th.

50 g. $KClO_3$ from Oxalate of Ca
Weight of $CaCl_2$ 188.5 g.
9.3 g.
197.6

Start 11.40 - 64.9
50 - 65.3
12.00 - 65.1
10 - 65.0
20 - 64.9
30 - 65.2
40 - 65.2 - 193.1
1 15 - 65.5 - 194.7

Cont. 1.50 - 65.5
2.00 - 65.3
10 - 65.1
15 - 65.1 - 197.2
25 - 65.2 - 197.75

Off!

Gas passes through:
Water, $CaOH$ (suspended)
chromic acid from $K_2Cr_2O_7$ + H_2SO_4, $PbNO_3$, $CuSO_4$ suspended, $CaCl_2$.

LXVI. July 15th.

As the Chromic acid used does not seem in sensible degree to diminish amount of Hydrocarbons, it is absorbed by a mixture of CrO_3 crystals and H_2SO_4 conc. — Rest in danger.

50 g. Cr_2O_3 from Isolation of Cr.

Weight of $CaCl_2$ - 239.1 g.
9.3
248.4

Start 2.10 - 64.7
25 - 64.9 (2.15 No Hydrogen
35 - 65.1
45 - 65.1
50 - 65.2 14. again)
3.00 - 65.-
10 - 65.-
20 - 65.-
30 - 65.- 240.5

Cont. 3.40 - 65. -
50 - 64.9
4. - - 64.9 - 242.1
10 - 64.9
20 - 64.9
30 - 64.7
40 - 65. -
50 - 65.2 - 246.5
5. - - 65. -
10 - 64.9
20 - 64.8 - 247.5
30 - 64.5
40 - " - 248.2

Off!

Calibration of Electro pyro-meter.

$R_2 = 100$

Gold (90°F) 68.9 B

Change	270	61.1
	280	63.2
	324	62.2
	332	61.8
	358	61
	368	60.2
	378	59.9
Change	410	59.7
	426	58.9
	450	57.7
	80	57.2
	500	58.3
	24	57.9
	550	55.2
	561	98.2
	63	98.3
	74	97.8

274	98.3
386	97.3
405	98.4
450	99.2
475	98.6
500	100.05
525	100.4
550	100.75
575	101.2
600	101.5
22.5	103
24	103.6
252	103.9
256	104.2
272	105
300	

Gun (450)

Naus. Pyrometer of
Bohemian glass.

452.5	48.4
300°F	53.2
390	53.4
~~482~~	52
442	52
488	58
532	59.3
little above 600	60.3
upper point 420	61
460	62.4
574	64
554	65.1
	55.4

33

16
61
1113

500 lbs in 3 [illegible]
167 lbs. [illegible]
in 10 Drums.
24" [illegible] and 12" [illegible]

68
[illegible]

Run 5

To Balance	
250	12
400	40
450	35
480	24
490	15
500	
550	

11 25		12 00
20		
54		43
16		58
57	1700	6
19	125	
6	550	17
11	570	18
18	590	1
30		500 YY
		1575 02
		600½ 2

Run 5

Start	10 50	550°, [illegible]
	11 00	5 20
	11 06	600
	12 -	
	12 05	Blower cut out
	12 10	520

$a^x = b$

$\log_a b = x$

$(a^x)^y = a^{xy}$

$10^{\log_{10} c} = c$

$(\log_a c) = \log_a b$

$10^{\log_{10} c} = c$

$\log_a c$ — $\log_a 3$

$\log_a c$ — $\log_a 6$

$\log_a c = c$

$\log_a(bc) = \log_a a + \log_a b$

778 foot pounds to one B.T.U.
14700 B.T.U. per lb of coal (or 7900 Cal)
12000 one lb coal

1 HP = 33000 ft. lbs.

French cal = 3.968 B.T.U.

$\frac{1}{3.968} = .252$

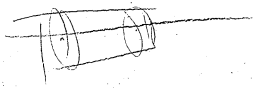
537 cal for evaporation

537 for 1 lb

2152
978
150
1350

---

550 ft lbs to HP.
33000 to HP



Notebook, N-01-07-19

N-01-07-19

July 19th 1907

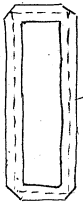
Rob Ralph.

Tests on "Ymoja" Cell.

1) Cell made in accordance with Ymoja Patent description (Complete specification pag. 5, 16-26.)

8.5g of a mixture containing 6 pts of Ag_2O, and 4 pts of flake graphite, pounded, moulded to a cake ½ × 133/1000 × 3". and wrapped in carefully moulded, plated copper gauze 200 mesh, the edges of which are held by a double frame of nickel plated copper (see sketch.) [1]

The silver oxide was prepared by precipitating $AgNO_3$ with KOH and washing 10 times.
The mixing was accomplished in the Edison way, i.e. by rolling on glass disc.
The copper was prepared from precipitated copper carbonate by ignition (extremely fine) and the copper pole assembled in the same way as the silver pole containing 8.5 g of a mixture of 6 pts CuO and 4 pts Graphite.



The elements are assembled under pressure in Edison connector and put into antique cell - only ventilated by a drawn out glass tube.

2)

6.5 g. of (6 Ag_2O + 4 Graphite) in Edison standard grid

6 g of (6 CuO + 4 Graphite) in Edison Standard grid.

6.5 × .6 = 3.90

Ag_2O + O = Ogen

216 + 32 + 16 = 248.

232 : 15.00 / 3.9 = 5.13

3.9 : x

232 : 5.13 | x = 1 / 58.3 / 232 = .27

124

.9 AH. of electricity

CuO to Cu — 24.20

Cu_2O to CuO — 12.10

Cu_2O to Cu — 12.10

12.10

All from grids reduced to anhydrous state in CP Potash.

Ag 1	Ag 2
Cu 1	Cu 2

All start at 4.30

300 M/A.

at 5.00 150 M/A till

Ag 1	at 4	7.30
Ag 2		9.00
Cu 1		2.55 am
Cu 2		12 N.

Both Ags put on
oxidizing in first
soda at 8.45 for 150 m/a.

No 1.
Gassing very slightly
at 2.20 p.
gassing considerably
at 4.20

No 2.
gassing very slightly
at 1.50 a.m.
Still gassing slightly
at 4.20
gassing heavily at
5.45

off 1 ¼ hrs.

1-24

Left overcharging till 3 pm
(the silver plates over and
drops off the nickel wire
in spite of all our
cleverness

To test the sol and
the mud etc the bottom
parts of sol and all mud
was dissolved in HNO_3 and
wholly sol turns thinking
the may be Ag with Cl from
the may be added herein
potash. HCl added herein
dissolved the whole cloud.
and shows no more AgNO3
but colours sol greenish
yellow (CuCl and FeCl, probably
is the NiCl.)
$K_4Fe(CN)_6$ shows no ppt
but turns sol dark brown.
- may be a mixt of copper
and Fe - chocolate and blue
or Ni^2 and Cu in case of
the copper gauge.
Both are pretty nearly alike.

Coupled up in test solution and started dialysis at 150 ml at 4.55

	Closed	Open	%	Closed	Open	
4.55	6 84		94	4.55 6 83		93
5.00	5 84		91	5.01 6 83		91
5.06	11 82		90	5.07 12 83		90
5.15	20 82		90	5.15 20 81		90
5.31	36 81		89	5.32 34 80		90
5.45	50 80		88	5.46 51 78		89
6.0	66 79		87	6.01 66 76		88
6.15	80 78		87	6.16 81 74		86
6.30	95 78		87	6.29 94 73		85
6.45	110 76		85	6.45 110 69		81
6.52	117 76		85	6.51 116 62		64
7.14	139 74		83	7.13 138 57		61
7.29	154 73		82	7.29 153 51		61
7.44	169 73		79	7.46 170 49		59
7.48	173 70		73	7.49 174 49		59
8 —	185 53		64	8.17 202 47		57
8.17	202 52		63	8.34 219 45		—
8.34	219 51		62	8.47 232 44		—
8.47	232 50		61	9 — 245 42		—
9 —	245 49		60	9.15 260 38		
9.16	261 48		—	9.30 275 36		
9.36	281 47		—	9.36 281 33		
9.49	294 46		—	9.49 294 27		
10.02	307 44		—	9.54 299 26		
10.14	319 43			10.01 306 25		
10.35	340 38			10.10 315 24		
10.41	346 36			10.20 325 24		
				10.35 340 23		
				10.42 347 23		

July 24th 1901

No1. Time	Closed	Open		No2. Time	Closed	Open
10 46	311 33		—	10.45	310 23	—
11.01	326 30		—	11 —	325 23	
11.16	341 29		—	11 15	340 21	
11.31	356 29		—	11.30	355 19	
11.46	371 28		Rather blue	11.47	372 17	
12 —	386 27			12 —	387 14	Just coloured blue at top
12 15	402 27			12 15	401 14	
12.34	421 27			12.24	411 13	
12.45	432 26			12.30	417 11	
12.49	436 20			12.45	431 11	
1.10	451 8			12.48	434 6	
1.20	461 0		off	1.05	449 0	off
1.30	471 0			1.25 AM		

1445 AM

Very sediment

Both quite opaque

1 or 2 small crystals

Still hardly enough to be of any importance

no sediment and not as strongly blue as 1

Charging test of cell #

10.55	~~[illegible]~~	.45 open
"	148	.69 V.
11.08		85
11.12		84
11.40		84
12.09		cur off
		.71 open
12.00		
12.05		.69 "
1.00		
1.15		86
1.55		86
2.40		81
3.00		116 slightly gas from + plate
3.40		117
3.54		119 more gas - fine
4.27		117 gas slightly little more at end of charge
4.35		118
5.10		119 gas when opened
5.40		120 gas - poor
6.16		122 gas a little stronger
6.30		125 gas - stronger
8.45		126 + further.
		128 Heavy gas from both plates.

not coloured

off at 9.00

Zend run. July 25th 1901.

#1 Time	Volts	Volts	#2 Time	Volts	Volts
9.35	132	140	9.34	133	141
9.48	78(?)	88(?)	9.44	10 84	91
10.07	77(?)	88(?)	10.10	30 81	89
10.15	75(?)	87(?)	10.15	41 79	87
10.20 45	80	88	10.20	46 75	86
10.33 53	79	87	10.32	58 73	84
10.54 1.19	78	86	10.54	80 69	61
11.03 1.27	77	85	11.02	88 65.0	60
11.15 1.39	76	85	11.22	1.08 49	59
11.24 1.48	75	83	11.31	1.17 49	59
11.34 1.58	74	83	12.13	1.59 46	—
12.41 2.25	50	61	12.41	2.37 43	
12.42 2.26	0	—	12.53	2.49 43	—
12.54 2.38	19	—	1.15	3.21 39	
1.16 2.40	48		1.30	3.36 37	
1.31 2.55	47	—	1.45	3.51 33	—
1.45 3.09	45	—	2.01	4.07 25	—
2.02 3.26	43	—	2.03	4.09 23	
2.15 3.39	40	—	2.10	4.16 22	—
2.30 3.54	38	—	2.15	4.21 21	—
2.45 4.09	30	—	2.30	4.36 20	—
3 — 4.24	29	—	2.38	4.44 19	
			2.45	4.51 18	
3.19 4.43	29		3 —	5.06 16	
3.34 4.58	27				
3.52 5.16	12		3.19	5.25 15	
4.15 5.40	20 (?)		3.34	5.40 7	
4.36 6.01	22		3.36	5.42 0	
4.45 6.10	22		9.00 PM		
5.25 7.50	0	off 9.00			off

[17]

3rd Run July 26 1901

	No 2 Chan.		Opening	
1	1 —	134	145	
11	1.11	81	90	
21	1.21	79	88	
46	1.46	76	85	
1.00	2.00	53	—	
1.14	2.14	51	—	
1.51	2.51	50	—	
1.58	3.05	49	—	
1.41	3.21	48	—	
1.59	3.39	47		
1.53	4.03	45	—	
2.03	4.23	43	—	
2.22	4.42	40		
2.45	5.05	33	—	
2.05	5.25	24		
2.95	5.55	19		
3.05	6.05	17		
3.25	6.25	13		
3.34	6.34	02		
3.36	6.36	00	3.36	off
	8.25 AM			
	5.25 AM			
	67			

Silver pole & Nickel wire

Silver pole to be oxidized in Cp ~~Potas~~ Potash for a longer while so as to have amount dissolved and plated on nickel wire

Run at 3.00 pm 29/7

Ws 10.20 a.m. Aug 2nd

The liquid is very clear but a slight plating has been observed on the nickel wire, the glass tube at the bottom of the contains a very small amount of black oxide that has to be tested

Test shows Ag.

[13]

Cells received each and put on [illegible] at 10.0 on Aug 2. [illegible] many have received a long and [illegible] [illegible] hourly till 10.0

4th Aug. 27th 1901.

No 2.

Time	Amp.	Volts	Volts	MAH.
10.06	150	128	142	
10.15	"	82	90	
10.22	"	80	88	
10.36	"	78	86	
11.05	"	75	83	
11.41	"	70	81	
12.11	"	66	78	
12.38	"	61		
1.01	"	52		
1.30	"	47		
1.41	"	49		
1.56	"	47		
1.57	"	46		
2.09	"	45		
2.29	"	41		
2.45	"	34		
1.55	"	30		
Stop 5	"	MAH		

[5]

Combination of Ag2O and
Manganese Cell.

Two small Edison Cells
containing nickel wrapped
Ag2O alone.

X I 5 (3g) blackening against Marine
X II 6 (2.7g) - - reduced - - -

So as to determine whether
~~both~~ Ag2O - oxidizes based
reduction by current

Will have made several
Ag2 and Cu2 and reversi-
capacity tests in same
way as is being done on
Edison cell. i.e. one by
against several Cu2 and
reversed.

Aylsw. best Potash used

#5 oxidizing at 11-37 am.
#6 reducing at 11-37 Sept 10

#5 - 150/1000 Amp. #6 150/1000 Amp.
gases alike 30 sec.
odd at 12.00 —
odd - 1.00 pm
gases at 4.45
620 AH

Both left on hill
8 30 am. Sept 11,
Sol. Potash changed and grid roasted in distilled Water. Quite some fine stuff escaped from grids and was kept suspended while cell was going.

Both removed after cleaning at 9.00

#5	#6
Reducing at 150 ma	Oxidizing at 150 ma
Both	clean at 10.00

[ITEM FOUND IN BOOK]

Rafn Special
No 2. Run Aug 3.1901 @13.

Time	Amp	Volt	Volt	Mat
	10.0		15.0	
3.40		140		
3.42	"	109	116	
3.46	"	83	92	
3.52	"	80	89	
4.09	"	79	88	
4.32	"	77	86	
4.47	"	75	84	
5.01	"	72	81	
5.13	"	76	79	
5.30	"	67	—	
5.42	"	65		
6 —	"	58	—	
6.15	"	57	—	
6.30	"	53	—	
6.45	"	49	—	
7 —	"	49	—	
7.15	"	x48	—	
7.30	"	46	—	
7.45	"	42	—	
8 —	"	36	—	
8.10	"	30	—	
8.18	"	27	—	
8.35	"	26	—	
8.50	"	24	—	
9.08	"	23	—	
9.16	"	22	—	
9.24	"	21	—	
9.44	"	19	—	
10.10	"	15	—	
10.25	"	14	—	
1.07				

28%

25 — 70

15.0

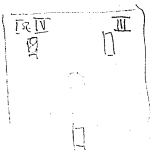
740 75 — 70

Notebook, N-01-08-12

Pyrometers

	Temp	(10)	(10)
(old) I	80°	A 47.9	B 101.6
II	70°	A 95.8	B 57.9
III	50°	A 95.8	B 56
IV	80°?	A 94.4	B 55.9
V	Broken.		
	Temp	Resistance.	

I worth old wires only
B (100) 107.6 ~.7
with short heavy
copper extensions
107.4



IV above I and at some distance from front wall

I	IV	III	Thermo
356	464	43	378.0
			422
{149 / 581			
600			520
713.8			540
937			
605.1			589

I	IV	III	I
	~~10~~	105.7	555
	A 104.1		558
	B 43		572
87.5			582
60.15			583

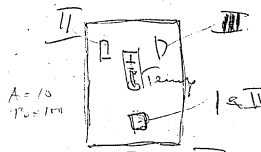
food I and IV reversed:
I above IV

60.0			569
93.4			
	B 43.1		575
	A 104.5		576
		A 105.65	576
		399	579

From all numbers
under heading T
to be subtracted 18-22°.
(at 200 : 22 , at 500 18

Actual Pos. of mus
Pyramidons: (~ 45 and 102

(B)



A = 10
T = 100

I	II	III	IV	T
95.15 RA				X04
	107.1 A X7.1 P			X05
				X07
		44.8 P 102.9 A		X07
				X07
			102.8 X5	X05
				X07
95 57.9 A				395

Aug 12th
Rum LXIII

Aug 14th Run LXVIII

Pyrometers I & II are in some way broken — certain to consist by the heating.

Pyrometer VII showed in the opening below the furnace and is protected against radiating heat by a [illegible] stopped iron and a similar plating piece of sheet asbestos

III shows.

B 56.2 with 100 and
A 95.9 " 10 at 72½ ft

There is this time used an additional absorber containing Chromosol absorbed on H_2SO_4 as other. Chromosorb is while Absorber I has a new powder column after Absorber of Absorber I free from Rubber connections with Hoses attached

12 lbs 10.2 oz

12 lbs 10.8 oz

Second absorber free

11 lbs 11.4 oz

10 oz 5.4

2.55 - 35.3
3.05 - 35.3
15 - 30.3
25 - 28.6 - 12 811.3
35 - 31.6
45 - 31.4
50 - 31.1

3.55 - 31.1
4. - - 31. - 12 815 g
05 - 30.2
10 - 30. -
15 - 29.7 15 1/2 g
20 - 29.3
25 - 29.5
30 - 29.1 - 13 8 2 1/2 oz
35 - 29. -
40 - 28.8 - 12.15.9 (added 1/2 g)
#1 12.15.7 - 45 - 28.5
50 - 28.3
#2 10.9.2 - 55 - 29.1 - 13 8
#2 10.6.3 05 - 27.2
10.7.8 10 - 26.7
15 - 26.5 - 13 8 1.3 oz
20 - 26.4
25 - 26.4 1.7
30 - 26.2
35 - 26.0
40 - 25.8 2.0 g
45 - 25.5
50 - 25.3 2.6
55 - 25.2
6. - - 25. - 3.0
15 - 24.8 13.7.4
#2 10.7.2 30 - 24.8
40 - 24.9
50 - 25.3
7. 05 - 24.8

7.10 - 21.8 - 13.86 oz.
20 - 25 -
30 - 25.4 - 13.7
40 - 25.8 -
50 - 25.6
8. - - 25.9 - 13.8 oz.
10 - 26.4
20 - 26.4

Cut out.

42 - 13.10.5

Absorbent: I 9 ℔ 12.5 oz.
II 8 ℔ 0.5 oz.

without comm. I. 10 ℔ 0.5 oz.
II.

with comm. I. 10 ℔ 2.8 oz.
II 8 ℔ 1.4 oz.

ASOP & Cobra does not work as absorbing device. II 8 ℔ 1.5

Aug. 15th. Run LXIX.

5 lbs of Tests from Oxide
Several little improvements on Drum
Temp to be kept at 750 - 785 °F
i.e. 33.3 - 33.5 on Pyrometer III

For absorbing tests used 2 bottles of Coke - dried by ourselves - at about 500 - 600 °F.
Drum revolves 3 times in 1 minute.

Pinne: 8.20 – 53.1 Schwelle 108,2 cg.
25 – 52.3
30 – 50.0
35 – 47.6
40 – 42.0
45 – 42.8
50 – 41.–
55 – 40.6
9.00 – 39.3
05 – 39.4
10 – 39.8
15 – 39.0
20 – 39.2
25 – 39.6
30 –
35 – 38.4 Start 1 – 3,1 cg.
40 – 39.0
45 – 39.0
50 – 38.8
55 – 36.2
10.00 – 35.2 – 10 – 6,3 cg.
05 – 34.9
10 – 34.8
15 – 35.–
20 – "
25 – "
30 – " – 10 – 7 cg.
35 – 35.3
40 – 35.4
45 – "
50 – "
55 – "

Time: 11. 00 - 35.4 - 108 7.7 mg.
05 - "
10 - "
15 - 35.5
20 - "
25 - 34.2 7.8
30 - 36.5
35 -
40 - 35.7
45 - 35.4
50 -
55 - 34.3
12. 00 - 34.1 8.8
05 - 34.
10 - 34.
15 - 34.8
20 - 35.5
25 - 34.2
30 - 34.- 8.1
35 - 33.3 - 108 9.1
40 - "
45 - 38.5
50 - 33.4
55 - 33.4 9.4
1. 00 - 33.3
05 - "
10 - 34.2
15 - 35.2 9.7
20 - 35.5
25 - "
30 - "
35 - "

Rise of temperature for 10 min

Time 1. 40 - 34.2 10 10.1
45 - 34.0 10.2
50 - 34.8
55 - 35.4
2. 00 - 39.0 10.0
05 - 40.-
10 - 40.6
15 - 39.8
20 - 40.2
25 - 38.6
30 - 34.4
35 - 34.2
40 - 36.6
45 - 32.6
55 - 30.8
3. 00 - 32.2
05 - 32.8 10.7
10 - 33.0
15 - 33.4
20 - 30.0
25 - 35.4
30 - 34.8
35 - 33.6
40 - 33.0
45 - 35.4
50 - 34.7
55 - 33.4
4. 00 - 34.3 - 108 11.3
05 - 34.-
10 - 33.0
15 - 33.1

4. 30 — 31.00
4. 34 — 33.5
4. 57 — 33.2 10.12.0g

5. 05 — 33.2
11 — 33.3
30 — 33.3
40 — 33.4
45 — "
50 — 33.0
6. 00 — "
10 — 32.6
20 — "
40 — 35.2
50 — 32.0
55 — 32.4
7. 00 — "

108 5.0g
#2 8.7
9.2 0g

#1 10.5g
#2 5.7g
#1 10 - 5.3
#2 8 - 2.7

15 — 32.2 new lab 9 - 4.1
2814.7 11.5g

25 — 32.7
35 32.
45 45
55 32.7
8 — 31.5

2 814.7
#1 9.52

2 9
#1 9.5.3

805 32.4

#1) 9.5.8
#2) 9 - 00

Time: 1.5 - 32.0

9.62

835 — 33.1
845 off

(1) 9.6.1
(2) 9.05

4.5
3.
6.5
9.

3
3

150g + 9/10

(725) 9.2
2.7
1.1
13.0 0g
3 0g
805 10.0.4

Notebook, N-03-10-29

N-03-10-29

The Pollack Patent

RR/P #107727;

This patent has been cited as reference in Lemon case.

and Siemens also has opposition from the same case 7423, 7957.

In Sept 1902 RR carried on a series of experiments with electrodes made according to Pollack specification, the object being to show the inoperativeness of same, and thereby obtain the grant of the application 7957, 7.

The results of these exp. are shown by affidavit of Curtis, filed in the named cases.

The electrodes used were approximately 3" x 1/10 and were in accordance with the demand of the patent examiner made up with graphite and

enclosed in Edison cups.

Siebenow has employed Dr Peters as expert, to compare the Pollock electrodes, for the original Edison fulgurite electrodes. The preliminary tests show very little, as Dr P employed external current for charging as well as discharging the electrodes.

My present experiments will have for their object to show:

1) How electrodes, made in strict accordance w. the Pollock specs, and operated in the most obvious and natural way, work.

2) How such electrodes would when experience gained during the development of the Edison

electrode are interrupted for instance show formation

3) If the Pollock electrode is plug made active, to prove that higher density of discharge immediately reduces then insert again.

4) to show the unsuitableness of the Pollock anode.

5) to show the superiorness of hollow electrodes and Edison Tesla electrodes.

Preparation of Pollock electrodes in exact accordance w. specification.

1) Materials: Iron powder or oxygen compounds of iron. The most common of these, and nearest at hand are,
a) Red oxide by roasting $FeSO_4$.
b) Iron scale, powder
c) Ferrum reductum
2) Incidental moisture
a) with water
b) w. HNO_3 or Nothing is stated regarding strength or quantity (Red oxide needs no HNO_3).
3) Pressing:
The mixt material is pressed in forms or on cores or nets. No particulars regarding pressure but this is immaterial as regards capacity.
4) Heating: and then slightly glazed: i.e. heated to dull red heat. Endurance of heating not stated hence to

be varied.

5) Formation. Conditions not given. It is reduced to use current densities corresponding to about .3–.5 amp. per standard cake. 3" × 1½" × 1/16"

I do not understand the term of the specification "the iron powder or oxygen comp. are usually moistened w. water and a other oxidizing agents". Iron powder ferrous oxide and scale are not wetted "moist" by HNO_3, but they are entirely transformed into Fe_2O_3, and this requires considerable quantities of HNO_3.

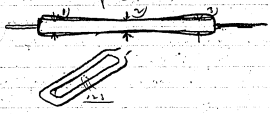
For this reason I stole in some cases soak the ready molded and crimped electrodes in 15% HNO_3 for some time, before testing to red heat.

The pressures used in assembling the cores and assembling the grids are those found best during experiments with the Edison electrodes:

molding core . 2-500 lbs (2-5 tons)
Crimping cups . 800 " (8 tons)
Corrugating grids . 500 " (5 tons)

After some preliminary experiments to find a way of carrying out the "pressing on a mixed core or core a net"; I find it the best and as it seems, a very appropriate way, to enclose the double mixed core, to Pollak in an ordinary Edison grid, of which the side pieces are cut out, leaving only 1/16" frame all round the core. This allows the exposure of the core to heat and current.

Calliper



#1. Red oxide by roasting $FeSO_4$, moistened w. water, Coke weighs 3.9 enclosed in ordinary Edison grid.
Calliper: 85 75 88/1000.
Roasted for 1½ hours in muffle, dull red heat.
8 charges à 2 h. 2 emptying 17 h charge
17 discharges — — — 1½ discharge
and 1 usually 4 h
1 139 2) Further 7 discharges 2 charges,
233.2 | 18 | 32 lost ch = 6 hours.
39 | 10 —
39.2 | 66 —
39.2 | —
3) 4 150
109.02 | 12 | 36
30.02 | 10
.31 | 30 off

✓

*103.
Iron Pile light — antimony (B) at high heat for 1½ h; put into 10% phosphoric acid, negative marked a point to, 375 mA. after half hour down .7 v.
After 30 hours charge, discharged at 100 mA. Bulbs 70 - 0V made of 45 sec.

*2 Underneath as 1.
Coke. Weight 3.0.
Roasted for 1h in 15% HNO3.
Roasted dull red, 1½ h.
Coke 87.77, 87/100.
Ordinary grid.
Charged and discharged like *1, up till first min.

14½		Further 7 charge.			
37 - 2	134 138	y 10 31	2	125	129
38 - 1½	116	32	1	116	121
38½ - 1	104 111	33		100	
39 -	84 9	34		80	off
39½ -	50				
40 — — —		10			
2					

#104. Two trons. positive & scale on edison grid, negat. 5 g to light at highest for 1½ h. In bichromate of Potash 10%. After little while 50 volt on .375 amp charging current.
charged 30 hours (?)
discharged ~~[illegible]~~ open 1.50
smoke too few lumbeth, closed
Manage voltmeter.

#3 Red oxide from sulphate
Coll 93, 83, 96 / 100 Weight 4 g
w. 20% Pluche Graphite worked
for 15–20 min like Edison el
Roasted 1½ h. dull red heat.
Ordinary grid
Charged at 2 Discharged like #1

	140 open		Further 7 charge	
105 .2	132	137	10.86 .2 .133	137 a
5½ "	121	129	47	100 112
6 "	110	120	48	93
7 "	105	115	41	60
8 "	102	113	50	80 off
8½ .	100		12	
9	96			
10	88			
11	70			
12	35		29	

✓

~~105~~ – 106 – 107.
Fe 264, 64 & 21

*4 Red oxide from $FeSO_4$.
20 % Graphite.
Coll 97.86 95/1000 W. 4g
Cooked 4 hours in 10% H_2SO_4 and
washed to dull red for 1½ h.
Ordinary grid
Charged at dry end of tube *1.

Res. open			Further Charges		
15.12	130	126	10.41.2	122	117
½	120		½	110	118
16	110	119	4.21½	103	
½	105	115	½	88	
17	100	113 4	½	66	
18	85		½	70	off
19	60				
20	15	17			

106 59 Scale 250 lbs.
Avoids nitric acid 15%
and starter in 5 hours.

12/7 12/9

57 Ferrum Reductum Purus.
Riedel, Berlin up to '70 made
and cipher 83,694. 59
Ordinary grid Meters 1½ h
Charged & discharged 12 x 1

144 open

30	136	144
31	137	138
32	131	136
37	132	137
41	132	137
45	131	136
50	130	136
55	130	136
57	135	137
05	128	134
7.00	128	134
10	127	132
40	122	129
45	112	119
8.00	110	115
20	105	110
40	100	
45	100	448
9.00	90	
05	80	
05	70	
10	60	
11	50	
12	40	
13	30 off	541

Further 7 discharges each
Open 1.83

9.12	120	124
9.16	127	132
20	127	132
29	127	133
9.44	127	132
10.00	125	130
15	123	127
27	110	114
35	108	112
45	106	
55	103	107
11.00	102	106
11.15	100	104
11.30	97	
35	93	23%
50	55	
12	off	
553		

X107

*6 Ferrous Reduction V
material like *5.
82. 20. 83. 59
Sample – 15% HNO_3 for 1 h
Heated to dull red for 1½ h
Ordinary grid
Charge a [illegible] *1

Open		
*404.2	134	137
5	130	135
	130	135
9.10	130	135
25	129	134
40	129	133
500	126	130
20	111	115
40	106	
600	105	107
14	100	433
20	95	
23	85	
24	80	
25	70	
26	60	
27	50	
28	40	
29	30 off	483

Further 7 h to dull red		
Open	143	
9.13.2	130	134
9.17	117	122
20	111	116
29	112	116
45	108	112
57	90	
59	80	
1000	75	
1002	57	
1005	43	
1007	30	
	250	

*7 Ferrum reductum

Material as 5 & 6., mixed w.
20 % Graphite.
86, 76, 88/100
Mixture was drilled for 1½ h.
Ordinary grit.

1.45	Open		Charged a drum lube *1
23	126-143		Further 7 ch & discs
24	122-134		Open 1.42
25	121 128		9.15 22-27 132
26	114 120		18 107 113
27	109 116		21 107 113
28	108 116		29 101 108
29	113 116		37 50
30	108 113		38 35
40	104 110		39 — off
45	102-109		
49	100	83	
50	95		
52	89		
54	83		
55	78		
57	70		
58	55		
59	40		
4.00	—	125	

Ferrum Reduction ✓

*8) Material as 5.6.7. no 200% Graphite
washed for 1h in 15% HCl03
heated to dull red for 1½h.
85. 76. 86 / 1000. Coke. 5gr
Ordinary Sand
Charge & Discharge like #1

8/10am 144.				Finally Charge 1.43.		
4.12	5min 138 - 140			9.22.02,	128	133.
14	126	132		25	111	115
4.26	126	132		30	110	115
40	126 - 134			45	102	102
500	120 - 126			47	96	
02	110	116		48	90	
20	105	112		50	82	
40 - 103				53	60	
55 - 100			3.43	55	42	
600 - 96				56	30. off	
05 - 90				~~10.03~~		
08	80					
10	70					
13	60					
14	50					
15	40					
16	30 off		4.13			

*9. Ferrous sulphide, chromite
200 mesh. 20% graphite
2.5g Fe$_2$ 69.66.70 / 1000.
Ordinary grid
charged fed after 60 ~ discharge
" " " 20 "

10 a	2 hours,	10 a	4	4 a	6 hrs	1 a	2
10/26	10 55.2	134	140	11/4	11 30 pm	137	142
	11 00	132	138		40	134	140
	15	126	132	11/5	12 00	130	135
	30	110	116		30	112	116
	45	108	113		1 00	104	109
10/30	1 05	105	109		30	100	105
	15	102			45	94	
	30	70			2 00	55	
	12 42	off			08	30	off
	350				5 26		

11/12		146
9.10 pm	138	145
13	137	142
30	134	139
1 00	127	
30	108	
4 00	103	108
30	100	
12 00	96	
40	65	

100

12/1
9 34 137 142
20 135 140
45 132
10 35 130 135
50 135
11 15 119
12 00 105
30 107
1 97
30 92
150 off
920

* 10 FeS. * 200. 20% Sulphuric
20. 5.B 20/1000 2g FeS
Bubbling good.
Charged lab after 1st discharge
20 ml
10 charge 2 hours. 10 ch 4 hours, 5 ch 8 hrs
last charge 7 hours, always 2 amps

10/29 10.05	2	134	140
11.00		133	138
15		129	134
30		111	116
45		108	111
10/30 12 05		103	107
14		100	
34		62	
12 140		off	
350			

			145
11/4 11 20 p.m.		132	142
38		134	140
11/5 12 00		131	136
35		122	126
1 00		104	108
30		100	105
45		96	
2 50		62	
06		20	off
5.23			

11/12			146
9 10 p.m.		138	143
14		138	142
30		135	129
600			
10 00		120	
35		114	
11 00		104	108
30		100	
12 00		96	
35		47	683

12/1

		146
9.10	137	142
9.20	135	140
35	132	
10 15	131	136
50	121	
11 15	106	
12 00	96	
25	[illegible]	
30	80	
12 50	off	
723		

*11 Blacksmith scale, of Norway Iron, at high heat, 200 mark.

81 77 82

Heated to dull red, 1½ h. " Bg.

Ordinary grind

Charged & discharged before #1

Crucibles — Tuttle Tice Clinton

open	1	42	
9 23	2	131	134
26	2	116	120
30		112	116
45		106	111
58		98	
10 00		91	
10 04		85	
10 06		82	
10 08		77	
10		68	
13		60	
16		52	
18		44	
22		off	200
200			

✓

#12 · Scale on #11

97, 82, 95. By

applied on 5-10% [illegible] for 1¼"h.
Heater for dull neck of 1½"h
Ordinary grind

changed 10 times

1247.2	144 132	126
48	128	
49	120	124
51	116	114
55	110	114
1.00	105	
1.10	94	
15	88	
22	80	
33	30 off	
189		

XX 13 Scale as 11212 w 200 g Imp

Reader for Scale see 11/1: 5g (dry)

Time	Rdg	Equil.
		145
4.24	140 –	146
25	132 –	137
28	129	135
40 –	126 –	132
500 –	109 –	115
20	106	111
40 –	100	253
50	95	
600	85	
05	75	
07	70	
09	60	
10 –	50	
11 –	40	
11 –	30 off	354

Further 2 ch 2 dried		
Open	145	
9.28.2	130	135
28	129	134
30	129	134
45	128	134
1000	126	132
15	123	129
27	110	114
35	109	114
45	108	114
52	107	112
11.00	107	112
15	104	109
25	1.00	106
41	63	
45	32	off
466		

* 1¢ Scale to 11/12/13. w 200's Inspection
Cooper — 10% RMS for 59 day
1¢ch, Roaster, Mill and [illegible]

#15 Iron leg H from Fe_2O_3
(opaline particles)
Ordinary grid
Heated to dull red for 1½ h
After 7 charges & discharges.
1) 180 open

1048.2	140	147	
49	133	141	
57	129	137	
1100	129		
20	126		
40	116	123	
1200	104	114	
15	100		
20	96		
40	88		
1.00	74		
10	62		
15	56		
17	40		
1.20	~0 off	503	

#101 Kg Tetryl (Rolpy), 2g Pb Acetate
in cut cups, 500 lbs pressure
#102 Kg Tetryl (Rolpy) 2g $CuCl_2$
in cut cups, 500 lbs.

Tetryl 4g, fuse
#16 like 15 [illegible] $HgCl_2$, 1½
Heated to duck red for 1½ h.
Sodium nitrite, after first 10 days.
Same after 7 weeks

x 17 Iron hydrogen
from Fe_2O_3 Oxalate precipitate
2.20 % Graphite 6 g
Heated for 1½ h at dull red
Ordinary grid

1)	–	52			10 min cd a dark		
23	144	149			1045.2	130	136
24	134	143			50	125	132
25	134	141			58	125	132
30	132				1100	125	132
40	131	137			15	124	131
300	123	135			28	123	130
20	125	132			38	122	128
40	120	128			48	121	127
400	109	117			58	118	
20	103	110			1210	108	114
40	100		457		15	106	114
500	94				20	105	
05	87				27	104	
15	81				30	103	
20	75				45	101	107
25	65				52	100	106
26	54				100	92	
29	42				14	88	
30	30 off		623		55	60	
					200	30	1/17

Re by H.

#18 Universal Bible-17, 2020 Empirical

Eg.

Bruhn.

#20. Scale of Wonder Iron
at high heat #200 mesh in
new sent cups (N. cupro) corrugated
82.75. 82 / 100 calc 5.3 g
Roosters ul bulbed for 1½ h.

	–	46		2	10 more dice
2.54	140	144			open 144
55	136	140		10.50	2 133 137
3.00	134	138		57	130 134
20	130	134		58	126 130
40	120	124		11.00	115 119
400	110	114		15	107 111
20	108	112		20	103 107
40	104	108		25	95 98
500	100	104	420	38	52
20	89			48	30 off
24	80			~~177~~ mAH	
28	70			40 pieces	
30	60				
32	50				
35	40				
37	30 off		543		

#21 Red oxide from $FeSO_4$
on cut expo. not corrugator.
90, 95, 91 — Cg.
Heater to deck [illegible] for 1½ h
1) Down at once on 1.5 min.
Open — 130
2) Down within one minute
further 6 charge — 6 h. 2
3) 1.05 115 125 Right down.
grey mass, recent opening.
H/5
2 40 — 110 —
41 60
O/A

Used as positive pole charged
discharge against rom.
Open 150 100% falls to 40
in 45 seconds, to 20 on further 1 min,
then down quickly.

*22 Red oxide from $FeSO_4$
on cut cups, corrugated
1/14 891 107/1000 3.5g.
[illegible] stroke red for 1½ h.
50
9 1035 35 140
Down at once on sand.
9 146
10.45 .2 Right down
Further 6 charges 6 h. red
11/10 1.02 and 10 112 130 Right down
with 2 mm. dark magenta like
*21
11/5
232 115
33 50

#23. Scale, of drawing from, high heat 80 mesh. ~~ice~~ cut crops.

Heated to dull red – flame for few minutes to coke broken

1236

Heated to dull red for 1½ h.

		– 152	2/	1103	122	132
1042 –	145 –	149		1102	125	130
43	138 –	142		1115	124	129
44	134	138		1128	114	119
45	132	137		37	103	111
55	126	131		40	103	108
1100	111	116		45	97	
07	107			58	98	
20	100			12 10	85	
21	95			15	76	
23	90			22 22	57	
24	85			25 25	20 off	260
25	80					
27	70					
28	60					
29	50					
30	40					
31	30 off			1103		

#23b. Feed of Winnowing from at high heat, 200 mesh
cut cup. 7g (wet)
Sloped 1 1/2 h
Dr preceding 10 oz

3) after 6th 6 chaffs a 6h. 20

11/10	1 00 am	126	127		cut	3.15	87
	12	125	126			20	60
	30	125	129			25	off
	2 00	122	124			780	
	15	108	110				
	35	102			11/10	940	132 132
	55	100				54	131
	3 15	98				1053	128 130
	40	86				11 30	122 122
	48	75				11 58	108
	52	43			11/12	12 12	106 109
	55	30 off		550		22	104
5) 11/4	1130 am	135	135			1 30	98
	38	133	137			50	90
11/5	12 00	131	133			2 08	62
	20	127	132			20	off
	1 00	122	126			933	
	15	110	114				
	30	108	111				
	2 00	103					
	45	89					
	3.00	95					

Re-next

#24 Scale like #23b
on cut cup. 7g wet
Sloped

		152				4pm	143
10.53	147	150			11 05	135	140
54	140	153			07	127	132
55	136	140			15	125	131
11 00	134	138			29	113	118
10	125				48	104	108
20	117	121			57	100	
30	110				12 10	92	
40	106	110			15	81	
51	100		193		20	70	
56	91				28	44	
12 00	82				12 30	30 off	
01	75					260	
02	70				3) after 6 mos chaffs on 6h. 72		
03	60				1 11 am	2 124	130
04	50				120	124	128
05	40				2 00	122	
06	30 off		2 40		15	120	125
					36	104	
					55	101	
					3 15	98	
					40	97	
					4 00	75	
					680	off	

4/

11/4	11 20	135	145 139
		133	137
11/5	12 00	132	137
	30	128	132
	1 00	124	128
	16	111	115
	30	109	112
2	00	104	
	30	102	
	45	99	
3	00	93	
	15	75	
	~~30~~	40	
	25	off	

780

11/10			141
9 40		(126)	126
		(124)	124
		127	133
10 15		127	133
10 56		123	129
11 30		106	112
11/12	12	109	102
	50	97	
1	35	83	
	45	73	
	50	off	

833 ✓

23 b

11/12	9 00 pm	136	145 140
	9 05	132	136
	9 30	134	138
	10 00	128	
	30	124	
	11 00	108	
	30	105	
	12 00	100	
	30	98	
	850		
11/14	9 00 am	139	140
	18	133	137
	44	132	
	10 15	129	134
	30	123	
	11 15	111	
	12 00	104	
	30	102	
	)	98	
	25	75	
	30	off	

✗ 25. From Pesle ~~in~~ Coke Cy. out cup mouthed before pressing w. Hilos. Reader is low and 1/2 [illegible] [illegible] 10 [illegible]

	1.25	121	125
	27	102	105
	31	99	
	38	60	
	42	off	53

2) [illegible] Coke [illegible]

11/14	4 14 am	125	129
	17	110	113
	24	106	109
	30	97	
	2 00	128	off

1150

11/4	11 28 pm	134	144 139
	32	132	137
	12 00	128	132
	30	109	112
	00	98	
	15	60	
	29	off	

120

11/10			146
9 50		140	146
	54	135	141
10 08		120	
10 52		125	120
11 00		110	
	30	105	107
	54	102	
11/12	12 10	95	
	22	65	
	25	off	

307 ✓

23b Condenser

Charged as anode for 30h.
discharge against iron. 200 ~~7~~
~~4/5~~ 1229 am. open 145. down
~~75~~. 50 in 75 seconds

30	43
34	30
38	20
45	6
48	4
55	3 open, reversed ~~7~~ .1.
1 00	2 150 ~~7~~
130	2
2 00	2 130. ~~7~~ off

#26 Ferrum Reductum

in cut cup. 8g

Heated to dull red for 1½ h
Charged 10 times.

1.23. 2	129	138			
130	125	130	10/29 1158	142	148 146
50	125		2/1210	132	135
55	125		25	131	134
2 05	124		46	130	134
20	122		1	129	
40	120		1 25	128	
3 00	102		48	125	128
25	102		2 20	112	115
40	100		40	107	110
55	98		3 00	104	
4 05	97		40	101	
15	95		4 05	98	
25	93		4 25	90	
40	87		45	77	
55	62		55	60	
5 00	46		5 00	60	
02	36		02	40	
04	30 off		10	off	
	730		1040		

11/4

12.30 pm 145 148 150
12.34 134 136
50 133 136
1.15 132
30 130
45 128
2.00 127
30 113 116
3.00 108
30 106
4.00 102
15 100
750 off

11/12 9.08 pm 136 140 145
9.12 131 135
30 131 135
10.00 128
30 ~~123 124~~
11.00 108 113
30 104
12.00 109
40 98

11/4

9.08 140 144
19 132 136
44 131
10.15 129 133
50 125
11.15 121
12.00 107
30 104
1 109 [illegible]
30 98
2.00 93
30 63
35 off
1090

#27 Ferrum Bichromicum
moderately ~~st.~~ HNO3 (B-4 ec)
~~and~~ pressed cut cups. 8g.
12 oz. = (Hecker) 1/12 x

1.20 127 130
30 125 129
40 125
55 124
2.05 123
20 122
40 108
3.00 107
25 105
40 103
55 107
4.05 100
15 99
25 98
40 89
55 32 off
110

10/19
1.59 132 136
11/1.19 109 114
26 107
45 101 105
1.50 off
Must have had short cut.

11/4 12.30 pm 134 138 148
1.25 112 116
50 95
2.00 62
103 off
~~Cut out~~
Poor crimp, loss cup.

#28

Brom Cuy Hydrogen (from flask
KeO_3 Oxalate funder) OK.
in clot cup. Hooked to Roller 1/2 59 2
after 10 minutes.

1)	1.16 .2	136	140		
	130	134	135		
	140	130		10/ 1200	133
	55	129		1200	142 146
2	05	129		1208	134 137
	20	128		1209	
	40	126		30	132
3	00	124		45	131
	25	120	125	100	170
	40	111		145	125 170
	55	105		215	124 125
4	05	103		40	107
	15	101		3 00	105
	25	100		40	102 105
	40	99		405	99
	55	98		30	94
5	10	96		45	88
	20	95		55	76
	30	93		500	60
	50	90		08	42
6	6/8	80 1000 off		11	off

11/4

12 20	139	147 145
35	134	138
50	133	
1 15	132	132
30	129	
45	128	
2 00	126	
30	111	
3 00	107	
30	104	
4 00	103	
15	99	
	off	

Terrum Reluctance.

#29 of some most

on #27 — Edison cupr. [illegible]

Meaches to dull [illegible] 10 charges

		115
1 20	112	118
1 30	104	109
1 40	103	
55	103	
2 05	102	
20	100	
40	97	
3 00	87	
20	40	
25	30 off	
	440	

2) after further 6 ch.

4 ch.		135
11/4 10 am	121	126
21	116	124
30	112	118
2 00	101	106
15	98	
35	88	
55	50	
3 00	off	

833

11/4		146
11/15 pm	138	138
19	115	
25	103	108
12 00	off	
10	90 off	
200		

11/10

10 10 pm	130	134
12	118	122
15	104	108
25	96	
33	76	
40	60	
41	off	
103		

#30. Scale of Norway from at high heat f. w. 207 Graphite. 15 g
In ordinary grade.
Charges 2 dies 5 times.

11/4 11.15 am	135	143 142
20	131	138
35	130	
11/15 12 00	126	133
15	124	
30	118	
35	108	
1 00	102	
30	107	
2 00	94	
12	89	
22	20	
30	20	
31	off	
650		

11/12 9 00 am	134	145 140
12	129	136
30	127	134
10 00	120	
30	107	113
11 00	104	108
30	98	
12 00	89	
12 10	off	
604		
12/1 9 05 pm	137	143
18	131	137
43	127	
10 15	121	128
35	109	
45	108	
11 15	105	
12 00	95	
25	88	
30	50	
32	off	
~700		

#31. Iron by Hydrogen, moistened w. ~~[illegible]~~ ~~[illegible]~~ with 150 Torr. Ergwith. Heater to dull red, open air for 1½ hours; then water ordinary gas.

5 charge, 6 hours a .2 amp.

~~[illegible]~~ charge (5) 8 hours.

10/24	9.55	144		11/4	11.27 pm	132 137
954.2	1.32	138				129 127
58	1.30	136		11/5	12.00	116 122
10.05	1.28	134			09	108
15	126	132			13	104
29	114	120			30	104
45	111	117			1 00	100
1 00	110	116			30	73
15	110	115			33	6
30	108	113			40	2.0 off
45	105	110			333	
12.00	101	106				
12.12	100					
20	98					
30	94					
45	82					
55	60					
1 00	off	606				

11/10

		144
10 55	129	135
11 00	126	130
10	123	
11 30	102	108
50	99	
11/11 12 12	95	
29	90	
45	O/A	

370.

*32 Fe by *, (like 30) bay, 10 hands
Neatness tr dull rct for 1½ hours.
Min tolerably good.

9/29/03 Belangs, 2 days, 144 hours, last ch 8 hours.

9.50 pm	138	188
57	131	
10.07	130	136
16	128	134
30	126	132
45	113	119
11 00	111	117
15	111	116
30	110	115
45	109	114
12 00	105	112
20	104	108
30	101	
45	100	
1 00	97	
15	91	
30	68	
1 36	O/A	733

144		
12.30 am	137	142
36	127	138
57	136	136
1 00	124	
15	117	122
32	108	
48	105	
2 00	104	
30	102	
3 00	93	
15	72	
20	O/A	
566		

11/10 141

10 56 130 134

11 08 126 131

10 125

30 121 126

40 102

11/11 11 12 100

57 93

1 06 82

10 75

18 off

460

* 33 Ferrum Reduction (see *5)

10 tons, 8 g net into the.

Reduce to dull red 1½ hr and enclose in ordinary grid

5 charges a 6 h. 2 ang. Cost ch. 8 hours

10/24 142

9.58 .2 125 135

21.08 106 116

10 08 103 113

17 92

24 70 off

90

11/4 11.25 pm 130 135

37 108 112

54 off

100

11/7 7 58 pm 143

8 08 130 126

13 108 113

25 102

28 50

off

100

11/11 1.00 pm 134

05 120 126

10 111 117

20 99

25 80

off

V 83

#34 Tc by hydrogen (see #15) mounted with 20% KHO, [illegible] 4 [illegible]. Started to dull red for 1½ hrs and closed — always grid.

Schange.	a	disch	6h.	Temp	lost ch	8 hrs
10/14.						
11:00 pm	12	132	137			
08		128	135			
18		125	132			
31		112	118			
45		109	115			
11:00		107	112			
15		105	110			
30		103	108			
45		101	106			
49/60	12:00	97				
	18	91				
	20	80				
	30	60				
	37	off				
	512					

11/4	11:25	131	137	
	36	126	133	
	55	108		
11/5	12:00	106	111	
	30	107		
	45	92		
	1:00	62		
	04	off		
	365			
7/11				
1:00 am		122	135	
1:05		120	129	
10		118		
24		100		
55		74		
2:03		off		
1209				

#35. Turn Reduction with $KClO_3$, 8g, 10 drops perchloric. Better to divide acid for 1½ hr. and enclose in ordinary grid:

5 charges & discharges. On a 15 amp. Cont. 10/29/03.

charge 8h.

		142	
10:05	.2	130	135
# 10	.2	109	115
18	.2	107	112
32		90	96
55		75	
80		30	off
(107)			

11/5

		142	
1:07	127	133	
8	123		
9	116	121	
10	107		
11	106		
20	100		
23	92		
24	85		
26	76		
28	58		
30	30	off	
		76	

11/11

		140	
1:10	125	132	
11	120	126	
14	105		
24	96		
34	50		
35	off		
83			

*36 Ferrum Reductum.

W. 20% Rad 8. 10 ton

Heated for 5 minutes the dull red and endosset in ordinary grid.

Charged 5 tins Ohm. 20 amp. lost 8 h.

14.9	1010	121	135
	19	108	114
	32	105	110
	35	100	106
	40	94	
	45	80	
	53	70	
	54	46	
	56	20 off	
		153	

11/5			
10	125	131	
12	118		
45	103	108	
55	100		
70	85		
15	off		
83			

11/11			
147		115	180 174
57		100	
208		55	
0.9		off	
73			

#37. Scale (see 11) moistened w. KNO_3. 9 gives much. 10th. Heater not dull red for 1½ hours and enclosed — orders my good

Charge = dresch 8 mins 6h + 2 amp boiler. 3h.

10/29 10.12	12	132	142 126
19	131		135
33	119		123
45	107		110
56	100		
11.04	80		
11.08	80		off
195			

11/12		142
845 pm	137	140
905	134	137
30	131	135
1000		125
30	108	112
1100	102	
30	98	
1155		off
633		

115		128
1.15 am	128	132
30	128	132
100	120	
16	118	
23	106	
45	101	
300	97	
15	84	
25	off	
#33		

38. Scale, (cell) wet with water

7 to 9 | 10. ~~Fong~~

Heated 1 to dull red for 5 min.

Charged 5 hours 6h. .2 amp Coatch. 8 hours

10/29	10/8/12	110	120
			114

~~Left hour with minutes~~

off

10	22.2	132	135
	28	131	135
	33	130	134
11	10	103	107
11	15	100	
	21	92	
	24	85	
	25	30	off

204

11/5		
1.20	125	130
1.30	124	
2.00	122	
10	120	
20	105	
25	110	
3.00	97	
15	80	
25	62	
30	off	

433

11/12	8.45		146
		136	141
	9.05	132	137
	30	129	134
	10.00	124	
	30	102	112
	11.00	100	
	30	98	
	15	off	

633

[illegible] Scale (#11), with weights

7.29 10 Tons

Weights two double rows per 1½ in.
and enclosed in ordinary grid.

Change a 6 in., 2 lost ch. 9 in.

10/29	11.02	136	139	5.10	90
	11.10	134	139	15	85
	16	129	133	18	77
	30	126	131	20	70
	45	107	111	21	60
11/30	12.00	98		22	50
	12.07	84		23	40
	11	70		25	30
	16	30	off		
	220			507	

		126	
1.34	129	133	
35	127		
45	126	131	
05	124		
25	122		
4.5	105		
05	101		
1.25	100		
1.45	97		
2.03	94		

Same pt. 2 disks all long. 140

11/12	10.25	137	142
	37	133	
	55	131	
	11.36	127	
	47	122	
	12.22	107	
	45	102	
	1.15	99	
	45	92	
	2.00	50	
	10	off	
	750		

#40 Red oxide (see #1)
mount 10 - roster. 6g. 10 tons
Heater for 1½ hours ordinary
grind. Works out and colors fast
throughout first charge.
4 charges a bk in Cast at 9 h.

10/29	11.19	.2 .125	100 120
	20	78	
	21	off	

11/5

2-29	.118	
30	80	
31	off	

41 Red oxide (see #) moist
with KNO_3 6 g 10 drops
Heated to dull red for 1½ h
enclosed in ordinary pipe
Washed out and colors not changed
— first charge
Lost 40 — out night down
11/5 284 110
25 80
26 off

#42 Red oxide (see #1) moist.
w. 30% NH_4NO_3 by 10 tons
Heated to dull red — explode

*43 Fe by H. (see *15) moist w. NH_3 NO_3 7 g. 100 [illegible]
Weather fr. dull rev. for 1½ hrs. and enclosed in ordinary grid. Charged 4 grains, the 2d boat at 9½

10½	1122	122	132
	33	127	134
12	24	119	126
	45	107	112
1	00	104	
	15	103	
	45	100	105
2	00	97	
	15	94	
	25	90	
	35	87	
	40	73	
	55	50	
1)	3 00	off	
	1700		
9	20	88	
	30	80	
	37	60	
	42	off	
	783		

			144
11/4	1150	123	127
11/5	1210	130	135
	30	127	
1	00	123	
	30	108	112
2	00	105	
	30	101	
3	00	94	
	30	60	
	35	off	
②	750		

4/4			147
	148	138	138
	52	131	
	250	127	
	310	125	off
	709	126	
	39	107	
8	48	102	
9	05	97	

*44. Scale (see *15) mount w. WH_3 NO_3, 7g. 10 ~~from~~, better for dull red for 1½ hour, enclose red in ordinary grid.

Chrysoph 44mm Ob 1.24, *time 9½ h

10/29	11:42	133	143 137
	44	128	128
	47	129	127
	1:00	107	111
	12	97	
	29	45	
	35	20 off	
	143		

11/4	11:50 am	132	132 128
11/5	12:00 am	131	
	30	117	123
	1:00	108	
	30	91	
	40	55	
	42	off	
	375		

11/14	*		147
	1:50	142	146
	58	133	138
	2:50	125	
	3:10	110	off
	6:08	(114)	
	50	97	
	8:17	88	
	21	off	
	513		

Further to be tried: Formic Reduction with and without NH_4ClO_4, heated for few minutes, say 3. When using the ly. from oxalate product, the time of heating is of little of importance for so soon as dull red is reached the whole cake ignites.

Further: Fe_2O_3, graphite & NH_4NO_3, heated, also good.

" Fe Scale " " " "

" Formic Reduction. " " " "

Notebook, N-04-08-24

04-08-24

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August 24, 1904.

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Results.

#3142 + 3143 ran practically the same as a good regular run. #3143 gained slightly in amp.-hrs. to 1V. the second time it was run this way.

#3201 gained 20 m-a-h. to 1V. but voltage was a little low all through.

On Silver Scale. 8/24/04.

Experiment #1.

Took regular little cells containing 2 Ni + 1 Fe and charged hot in water bath at 48°C. Set stand in room for ½ hr. after charge and then discharged regular.

Results.

*3183 dropped off 234 m-a-h. to 1V. and 107 to .50. Had a peculiar curve. First half of curve showed gain in voltage over reg.

Repeated experiment on *3184 and fully corroborated results.

8/26/04.

*2.

Took regular little cells as in *1 and charged regular in room. Set stand in water bath at 48°C for ½ hr. and then discharged at this temperature.

8/26/04.

#3.

Took regular cells as before and both charged and discharged in water bath at 48°C.

Results.

#3183 + 3184 showed no gain in amp.-hrs. over best regular run but increased by about .03 in voltage.

Results.

*3142 + 3143 lost about 50 o/o to 1V. and 26 o/o to .50. Break in curve.

8/23/04.

*4.

Took regular little cells and charged in ice water at about 2.7° C. Set stand in room at usual temperature (about 24°C.) for ½ hr. and then discharged regular.

Results.

Cell with the 7e charged cold lost 25 o/o to 1V. and 6 o/o to .5o and had the usual cold break in the curve.

Cell with the 7is charged cold had a good normal curve and ran as many m-a-h. as the lowest regular run. It showed practically no bad effects.

8/26/04.

#5.

Charged #3142 regular and #3143 in ice water at 2°C. Then took cells apart and cross-assembled and ran at regular temperature.

Results.

Ran 850 to 1V., 963 to .50 with slight break in curve but otherwise fairly good.

Shows that H alone is needed to chg. the Zn. H probably takes no part in it.

Oct 5th.

#6.

Took a new 4.5 g. Zn and charged it in distilled H_2O. against a C.P. Zn strip, right across the line. Charged about 12 hrs. but the current varied a great deal and probably did not average as much as 100 m.a. Then assembled with 2 chg'd. Zns and ran in 21 % KOH.

Results:

Ran 690 to 11., 803 to 50 Slight breaks.

It probably got fully charged but did not run good because NH_4 always limits the Fe.

"7.

Same as #6 except charged Fe in NH_4OH. Got full 200 note.

Results.

25-C. | 103 | 139 | 157 | 181 | 187 | 207 | See #10.

4/19/05.

#8.

25-C., pocket from old Endurance cell treated as follows,-

1. Washed in hot H_2O 6 hrs.
2. Dried 10 hrs. moderate heat.
3. Soaked in hot conc. $CoSO_4$, $(NH_4)_2SO_4$ solution 4 hrs.
4. Connected up as cathode with Pt strip as anode and dipped in dist. H_2O and plated Co inside @ 1.4 amps for 10 min.
5. Washed in hot H_2O then KOH, then run reg. in 21 % KOH.

Results.

25-A.	156	175	201	237	258	300	305	203	243

Run charged 15 hrs.

25-A	303	319	320	315

4/20/05.

#9.

Treated old pocket 25-A as follows:-

1. Charged 15 hrs. @ 200.
2. Washed 6½ hrs. in hot H_2O.
3. Dried 2½ hrs.
4. Soaked in $CoSO_4.(NH_4)_2SO_4$ 13½ hrs.
5. Plated Co inside in very weak Co solution 2¼ hrs.; starting current at 1 amp. and reducing to .7 amp. as cell heated up.
6. Soaked in hot H_2O 5 hrs. and in KOH ½ hr. then assembled and room reg. in 21 o/o.

Results.

N.9. - Pocket swelled great deal. Room about 45 m-a-h.

4/25/05

#10.

Retreated 25-C. as follows;-

1. Washed free of KOH 8 hrs.
2. Dried 5 hrs.
3. Soaked in $CoCl_2$, NH_4Cl solution hot conc. $10\frac{1}{2}$ hrs.
4. Plated to inside @ 1 amp. hot for $\frac{3}{4}$ hrs. Weak sol. outside.
5. Washed in hot H_2O for 5 hrs.

+ KOH 1 hr. Assembled + rain reg.

Results.

179-A..	1st mm	264	Sat'rng mm before
	2nd "	251	treatment - 430 to 11.
	3rd "	243	
			Removed + changed KOH.
	4th "	297	
	5th "	282	
	6th "	280	

4/26/06.

* 11.

Disassembled old cell * 179 and soaked in pockets in dist H_2O 10 hrs. till free of KOH.

2. Dried 12 hrs.
3. Soaked 179-A in $CoCl_2$ $3\frac{1}{2}$ hrs.
4. Dried $\frac{1}{2}$ hr.
5. Soaked $\frac{1}{2}$ hr. more in $CoCl_2$.
6. Dried $\frac{1}{2}$ hr.
7. Soaked in dist ~1 o/o KOH $1\frac{1}{2}$ hrs.
8. Changed KOH and chg'd and rain reg.

Results.

179-B	1st run	395	Said reg. run
	2nd "	478	before treatment
	3rd "	451	run 430 to 1V.
	4th "	458	
	5th "	458	

4/27/05.

#12.

Treatment of 179-B.

1. After drying 12 hrs. in #11, put in $CoSO_4.(NH_4)_2SO_4$ and soaked 24 hrs.

2. Plated Co inside at 1 amp for ½ hr. Used dist. H_2O with few drops of solution + Co anode. Blue hydrate of Co formed in solution. Very dense.

3. Soaked in hot H_2O 24 hrs.

4. Put in KOH and reversed against strip 1¾ hrs. @ 2.4 amps.

5. Put up with 2 chg'd Zes and run reg.

Results.

#13. 1st min. 457 Very little tail.
2nd " 483
3rd " 487
4th " 487
Removed + changed KOH.
5th " 474
6th " 495

4/27/05.

#13.

Regular 3.2 g. 7½, new.

1. Warmed w/o then dipped in $CoCl_2$ 10 min.
2. Dried 10 min.
3. Soaked 10 min more in $CoCl_2$.
4. Dried 30 min.
6. Soaked in hot 7% KOH 6 hrs. then changed KOH and chg'd + min. reg.

Results.

*14.	1st min	305	No tail.
	2nd "	362	
	3rd "	380	
	4th "	380	
	5th "	380	

5/1/05.

*14.

Regular 3.2 g. Zn, new.

1. Warmed up then soaked in $CoSO_4$ 3 hrs. hot.

2. Soaked in hot 21 o/o KOH 40 min.

3. Reversed against strip in 21 o/o 1 hour at 2.15 amps.

4. Assembled with 2 chg'd Fes to run reg. in 21 o/o.

Results.

#15. 1st run 413 Hardly any fail.
2nd " 443
3rd " 448
4th " .445
5th " 445

5/1/05

#15.

Reg. 3.2 g. Ni, new.

1. Warmed up then soaked in $CoSO_4$ 3 hrs. hot.

2. Soaked in hot 21 o/o KOH $1\frac{2}{3}$ hrs.

3. Assembled with 2 chg'd Fe to run reg. in 21 o/o.

Results.

#16 - a	115	126	Changed KOH	132
b	88	104		111
c	85	92		97
d	114	111		114

5/1/05.

#16.

Four new pts - reg. 3.2 g.

Warmed up and then put them all in hot conc. $CoSO_4(NH_4)_2SO_4$. Soaked in this solution 4 hrs. then dried 1 hr. and repeated this treatment 4 times. Then soaked 6 hrs and plated as follows, using Co anode and few drops of solution in dist. H_2O

a - Plated ¼ hr. @ 2.1 amps.

b - " ½ " 1.14 "

c - " 1 " .5 "

d - Used fairly strong solution and plated 10 min. @ 2.5 amps.

Then washed all in hot dist. H_2O, changing every few hrs. for 38 hrs.

Put up with chg'd Tesla in 21 o/o and run reg.

Results.

1st run. – Started at 1.2 V. and ran 260 m-a-h. to 50 V., averaging 1 V.

2nd run. – A lot of lead plated out of solution on the Ni. I took it off and changed solution and continued charge. Discharge started at 1.0 V. and ran 40 m-a-h. to 50 V., averaging 1.08 V.

*17-A | 448 | 462 | 472 | 442 | 428 |

6/20/05.

*17.

Put up strip of ordinary Pb against one reg. Ni pocket in 21.0% KOH. Ni on oxygen side.

Chg. reg. 15 hrs. @ 200. Run @ 100.

*17-A.

Put up Ni pocket from *17 with two Zs in fresh KOH.

Results.

Would not run at all. Some lead plated on the iron, but not very much.

*18 - A | 1313 | 1233 | 1223 | 1385 |

6/21/05

*18.

Put up strip of Pb as anode against one reg. Fe pocket in 21 % KOH.

*18 - A.

Put up Fe from *18 with 4 hrs in fresh KOH.

Results.

After 3 days, 24 cc. of gas had accumulated.

Collected from same kind of water in 3 days 2 cc of gas.

*19.

Took one reg. Fe pocket and charged fully. Then put under water and collected gas.

Results.

	20 - A			20 - B
Run #1	1069 to W.	1487 to 50		1133 - 1607
2	1100	1780		1140 - 1897
3	1245	2012		1298 - 2087
4	1083	1767		1250 - 2058
5	1133	1833	500 mile	1192 - 1967
6	1158	1875		1167 - 1908
7	1375	2088		1375 - 1587
8	1400	1955		1311 - 1561
	Chg'd fully + S.C. 4 hrs. —			
9	1455	2027		1462 - 1600
	Chg'd fully + S.C. 6 hrs. —			
10	1532	2093		1510 - 1667
11	1273	1923		1248 - 1573
12	1327	1927		1307 - 1577
13	1300	1927		1233 - 1577
14	1308	1900		1215 - 1545
15	1350	1967		1257 - 1593
16	1297	1933		1179 - 1567
17	1317	1910		1173 - 1550
18	1300	1867		1133 - 1547
19	1333	1867		1173 - 1533

#20

Put up two cells of reg. Fe mix 4 g. cake against from 3.5 g. Zn, to get curve of reg. mix and also to see effect of short circuiting.

Run through regular test first.

Results.

	1	2	3	4	5	6
21 A	485	492	510	488	485	493
B	488	480	485	462	458	465

Fully chg'd A and put both on heat standing test at 4.00 P.M., July 28, 1905.

9-7-05. Cells have stood 6 weeks. Took them off of hot test and allowed them to cool. Then discharged A at 100 without further charge. It ran 27 m-a-h. to 1V. and 28 to .50 V.

Then chg'd + ran both cells regular several times as follows,-

	7	8	9	10	11		12	13
21 A	502	490	491	475	477	Charged Now	494	492
B	344	425	434	438	424		438	448

The cells have deteriorated much more than the results to 1V. show. The heat in some way has created resistance in the pockets so that they break from 1.28 to about 1.15 V. sometime before breaking past 1V. This is more marked in B than A. It hardly showed in A on the first run but developed in the second and grew worse and worse each time. B went just the opposite way.

7/11/05.

#21

Put up two reg 7/2 mix cells, 3.2 grams against two 4.5 gram Zes, 21 o/o KOH in metal cans. Give them a few runs on the board and then charge one fully and let the other be discharged and put them in the Hot Test in this condition. Do not correct them up to charge and discharge but just let them stand in the heat for about a month and then run on the board again.

It was bad on the first run and improved somewhat with running but never came up very far. It's best curve broke after running only 3 hrs. nominally.

This resistance shows also in the tail which starts at .48 to .50 V. instead of .70 to .73 V.

Results.

	1	2	3	4	5	6
22 A	469	479	493	463	467	475
B	497	488	502	480	477	485

Fully chg'd A and put both on cold standing test at 4.00 P.M., July 28.

9-7-05. Discharg'd A after standing chg'd 6 weeks. It ran 3.26 to 1V. and 3.92 to .50, voltage averaging about 1.20 = 30 o/o loss in watt-hrs. to .88 V.

Then chg'd and ran both cells regular several times as follows,—

	7	8	9	10	11		12	13
22 A	490	483	472	472	467	Broke	474	479
B	471	485	478	480	473		480	485

Lime is more rounded at the bend, showing resistance has increased slightly, but is practically as good as before.

7/11/05.

#22

Put up two cells exactly the same as in #21 and treat them just the same except let them stand the same length of time cold.

Results.

Center cal. dry -	23 A	93	23 B	92
After 1 hr. soak	98	5	96	4
" 6 hrs. "	98	0	96	0
" 1st charge	100	2	99.5	3.5
" ½ hr. stand	98	-2	98	-1.5
" 1st discharge	100	2	100	2
" 3 days stand	100	0	99	-1
" 2nd charge	100.5	.5	101	2
" ½ hr. stand	100	-.5	99	-2
" 2nd discharge	101.5	1.5	100.5	1.5
" 3rd charge	100	-1.5	99	-1.5
" ½ hr. stand	99.5	-.5	99	0
" 3rd discharge	101	1.5	100	1
" 4th charge	99.5	-1.5	99	-1
" ½ hr. stand	99.5	0	99.5	.5
" 4th discharge	101.5	2	101	1.5

This shows that on the first two charges the mils that were gained disappeared in each case after cells had stood 15 minutes, and on the second two charges mils were actually lost.

Mils were gained however on discharge in each case and on the four discharges 23 A gained 7

9/8/05

#23

Put up two cells reg. 3.2 g/l against 2 Zn in 21 % KOH to note swell of Zn. Mark point in the center of the pocket and take all calipers at this point. Take caliper dry and after soaking in KOH a few hrs. Then during both charge & discharge take caliper readings at frequent intervals.

Charge Rate 200 m.a.
Discharge " 100 "

and 23 B 6. It is seen also that a large proportion of the swell came from soaking before the first charge – 23 A gained 5 and 23 B 4 – and this of course was a permanent gain as it never dropped below this caliper after soaking.

The total gain in four runs was for A, 8.5 and B, 9.

Results.

Center cal. dry -	24 A 92		24 B 93	
After 1 hr. soak	96	4	96	3
" 6 hrs. "	96	0	96	0
" 1st charge	119.5	23.5	121.5	25.5
" ½ hr. stand	119	-.5	121	-.5
" 1st disclg	120	1	120.5	-.5
" 3 days stand	118	-2	118.5	-2
" 2nd charge	128	10	129	10.5
" ½ hr. stand	127	-1	129	0
" 2nd disclg	130	3	130.5	1.5
" 3rd charge	128.5	-1.5	129.5	-1
Changed KOH to 21 o/o.				
" ½ hr. stand	128	-.5	128	-1.5
" 3rd disclg	131	3	131	3
" 4th charge	127	-4	128	-3
" ½ hr. stand	127	0	128	0
" 4th disclg	130.5	3.5	130.5	2.5

After cells had smelled they ran practically the same in 21 o/o as they did in 33 o/o. The amp-hrs to 1V. did not get very high from the 33 o/o but curve had a long tail. Amp.-hrs. came down after 1st chg in 21 o/o, but smell would not come down at all.

*24.

Same as *23 but in 33 o/o KOH.

In these runs the total gain on charge, subtracting that lost by standing, was, for 24 A, 30 and for 24 B, 33.

Gain on discharge 24 A, 7 and 24 B, 4.
Gain on 1st soak " 4 " " 3.
Total gain " 39 " " 38.

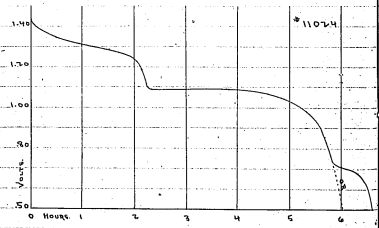
The gain on discharge was about the same as in 21 o/o (See *23) but they had the additional large smell on charge which is hard to account for unless it may come from trapped gas.

After the big smell has been attained they act same as 21 o/o — see less in cal. on 3rd chg. + gain on disclg

Results.

4 g cake of this with regular pressure or less was best. Took long time in forming before KOH came free of S. Short-circuiting after a full charge improved its running.

Best run was 1044 to 1V. – 1350 to .50 but there was always a big break in curve after about 2 hrs running as shown below.



9/13/05.

*25

Made mix to get curves for German patent case as follows,–

32 g. FeS, Pyrite – through 200 mesh

8 g Graphite

Mixed well dry and then moistened with 33 % KOH and rolled 20 min.

Pockets will be changed + reversed and KOH changed after each run – till it tests fairly free of S. Then run.

Pockets swelled great deal. Some of them split.

5 g. cake of plain FeS, through 200 mesh runs about 380 to 1V. – 440 to .50 V. after being formed in same way.

Results.
Not as good as 8 + 2.

9/15/05.

#26.
Same as #25 except made 7+3 mix.

Results.

Cells stood for two weeks after making up before running.

Caliper of H_2S after 2 weeks scale in 33 o/o was —

	27 A	27 B	
	97-101	97.5-98.5	
Hot	95	95	After 1st charge
"	95	95	" " discharg
"	95	96	" 2nd charge
"	95	96	" " discharg
"	96	97	" 3rd charge
"	98	98	" " discharg
"	98	98	" 5th charge
"	98	98	" " discharg
"	99	98	" 6th charge
Cold	101	106	" " discharg
"	113	112	" 7th charge
"	113	111	" " discharg
"	116	111	" 8th charge
"	118	111	" " discharg
"	122	114	" 10th charge
"	125	115	" " discharg

9/19/05.

*27

Put up two cells in metal cans of one reg. 3.2 g. H_2S against 27 as in 33 o/o KOH, to see if H_2S swells as much in hot 33 o/o as in cold. According to the gas swell theory it should not.

Caliper at marked point.

Results.
About the same as #25.
B was slightly better than A.

9/19/05

#29

A. - Mixed 20 g FeS (thru 200 mesh) with 5 g. foliated graphite. Rolled dry and mixed well together. Weighed out two pockets 3.7 g

B. - Took mix that was left after weighing out two pockets dry, and moistened it with 33% KOH and rolled about ten minutes longer. Made two 4 g pockets.

Results

	#29 A	#29 B
Run 1	1267 - 1960	1200 - 1860
2	1200 - 1907	1200 - 1880
3	1267 - 2013	1267 - 2020
	Chg'd fully and allowed to self-heat in air 2 hrs - i.e. they had heated and cooled off in 1 hr but let stand 1 hr. more after cooling.	
	E.M.F. with chg'd p's when reassembled was A .50 B .70. Put on discharg @ 200 and P.D. of both was .40 at first but reached 0 in few minutes.	
4	1333 - 2093	1280 - 2010
5	1310 - 2047	1317 - 2015
6	1390 - 2067	1333 - 2050
	Chg'd fully and allowed to self-heat in air 3 hrs.	
7	1383 - 2103	1333 - 2030
8	1331 - 2093	1305 - 1991

Seems to have some beneficial effect that short-circuiting has.

10/13/05.

#29.

Determine if self-heating after a full chg. affects the running of our regular Je mix.

Put up two cells of one 4 g Je against six chg'd. p's. Give them two or three regular runs and then charge up full and unsolder them. Take out of KOH and let stand in air until they heat up and cool off again. Then put back in cells, charge & run as before.

Results.

30 A	483	497	481	487	Bad cell.
B	498	523	517	497	
C	497	523	507	495	
D	499	520	510	500	

30 A	Fully charged + set in Hot Test for 1 hr. Discharging
B	" " " " 3 hrs. " "
C	" " " " 5 " " "
D	" " " " 24 " " "

30 A	452	483	487 - 452 = 35 lost
B	487	498	497 - 487 = 10 "
C	481	500	495 - 481 = 14 "
D	460	527	500 - 460 = 40 "

10/13/05.

#30.

#71 A shows that Pb cannot hold its charge when heated to about 55°C. for a long time.

Determine how quickly loss of charge takes place at this temperature by making up four reg. Pb cells, 3.2 g. in metal cans and after running several times, charge fully and let stand in Hot Test for different lengths of time before discharging.

Results.

	31 A	31 B
Run 1	522 - 633	572 - 640
3	517 - 630	515 - 630
	Fully chg'd and took Hg out. Set stand in air 2 hours then dis.	
4	497 - 578	495 - 581
	Fully chg'd and took Hg out. Set stand in air 4 hrs.	
5	485 - 567	497 - 567
	Fully chg'd and took Hg out. Set stand in air 20 hrs.	
6	337 - 525	420 - 522
7	457 - 567	473 - 577
8	448 - 553	477 - 595
9	465 - 558	483 - 617
10	450 - 567	477 - 603

Run 6 was a peculiarly bad curve. A.V.P.D. was about 1.12.

This treatment seemed to do the Hg permanent injury, as it never regained either its full capacity or voltage. Resistance was introduced in some way.

10/13/05.

#31

To determine if Hg loses its charge in air.

Make up two regular Hg cells 3.2 g. and after running several times regular, charge fully, take out of KOH and let Hg pockets stand in air for different lengths of time before putting back in cell and discharging.

Results.

	32 A	32 B
Caliper after discharge #8	98	98
	Put in 33 %	
Charge #9	115	111
Discharge 9	117	114
Charge 10	118	120
Discharge 10	122	124
Charge 11	122	125
Discharge 11	126	127
Charge 12	—	130
Discharge 12	130	136
Standing	130.5	133

Soaked 3 ½ days in warm H_2O till phenolphthalein showed absolutely no trace of alkali.

Caliper then was 128 129

10/18/05.

#32.

Take two regular 3.2 g Ni cells which have been running, and caliper. Then put in 33 % KOH and charge + discharge regular, caliphering Ni after each, for several runs. When the swell has reached maximum take Ni out after discharge and soak in warm H_2O until free of KOH. Caliper again.

If the swell is due to gas this treatment should bring it down.

Results.

	33 A	33 B
Run 8	508 - 617	482 - 583
9	490 - 563	480 - 553
	Washed, chg'd Ni's in H_2O 2 days till free of KOH. Then assem. & dis. reg.	
10	447 - 557	417 - 520
11	487 - 603	450 - 553
12	492 - 615	481 - 567
13	482 - 608	478 - 567
	Washed, chg'd Ni's free of KOH and let stand in air 24 hrs. Dis.	
14	310 - 373	273 - 367
15	457 - 587	413 - 477
16	470 - 585	423 - 508

10/19/05.

#33.

Take two regular 3.2 g Ni cells and after giving three or four regular runs, charge regular then take Ni's out of cell and wash for several hours in cold water, changing it frequently until it tests free of KOH. Then assemble pockets back in cell in reg. KOH and discharge regular without further charge.

Results.

	34 A	34 B
Col. after		
⅓ of Chg. #1	94	97
Charge #1	101	100
Discho. #1	99	101
C — 2	102	101
D — 2	102	102
C — 3	104	103
D — 3	104	103
C — 4	104.5	103
D — 4	105	104
C — 5	105.5	104.5
D — 5	107	105
C — 6	106.5	105
D — 6	107	105
C — 7	107	105.5
D — 7	109	106
C — 8	109.5	106
D — 8	110	106.5

Ov. cap. was 34 A 330 to 1V, 490 to 50
34 B 320 " , 480 "

10/20/05.

#34.

#34 on the first charge showed that for the first 3 hrs. the swell in 33 o/o was no more than in 21 o/o.

Make up two new reg. 3.2 g Pb cells and run them in 33 o/o charging only 3 hrs. each time and calipering in center after each charge + discharge.

This is to see if swell will keep down on short charges.

Results.

	35 A	35 B
Cal. after ⅓ of Sing. #1.	95	92
Charge #1	96	91
Discharge #1.	98	93
C - 2	98	93
D - 2	99	95
C - 3	100	95
D - 3	99	95
C - 4	98	94
D - 4	100	96
C - 5	99	95
D - 5	101	96
C - 6	99.5	95.5
D - 6	100	96.5
C - 7	99.5	97
D - 7	101	97
C - 8	99	96
D - 8	100.5	97.5

Av. calp. was 35 A 388 to 1V. 490 to .50
35 B 380 " " 475 "

10/20/05.

#35.

Make up two new regular 3.2 g. Zn cells and run them just the same as in #34 except in 21 o/o.

For comparison with #34.

10/20/05.

#36.

Take two regular 3.2 g/h cells which have had several runs in 21 o/o and charge 15 hrs. @ 200. Then fill with 33 o/o and after letting them stand 15 minutes discharge @ 100 to .50 V. Caliper after charge and discharge.

Repeat this several times, charging in 21 o/o and discharging in 33 and note swell.

Results

	37 A	37 B
Dry cal.	89	91

Cells stood a little over a year after making up before the solution was put in and ~~the~~ the following test made —

37 A	37 B	
89	89	Dry caliper
90	91	After soaking 3 hrs.
91	93	After 1st charge
91	94	" " reverse
92	94	" 2nd charge
93	94	" " reverse
93	95.5	" 3rd charge
94	96	" " reverse
96	98	" 4th charge
95	98	" " reverse
94	97	" 5th charge
95	97.5	" " reverse

Total gain 37 A = 6
" " 37 B = 8.5

10/20/05.

#37.

Make up two pockets of graphite to caliper about .090". Assemble each one with two empty grids in 33 % KOH.

Charge with graphite as anode for 15 hrs. @ 700 then reverse for same length of time @ 700. Take center caliper every 3 hrs.

Repeat several times.

Pockets were made at Silver Sake. 3.5 g cake, S.P. 650, Con. 500.

Results.

	38 A	38 B
Dry cal.	93	91

Cells stood a little over a year after making up before the solution was put in and the following test made —

38 A	38 B	
92	91	Dry caliper
93	90	After soaking 3 hrs.
93	92	After 1st charge
93	91	" " reverse
95	92	" 2nd charge
94.5	93	" " reverse
94	91	" 3rd charge
95	94	" " reverse
96	96	" 4th charge
95	93	" " reverse
95	94	" 5th charge
96	94	" " reverse

Total gain 38 A = 4
" " 38 B = 3

10/20/05

#38.

Same as #37 except use 7 10% KOH

Permutto.

		1	2	3	4	5	6	
39	A	242	220	178	158	162	143	av. 229 to .50
	B	245	227	163	162	165	133	" 220 " "

Assembled each as Fe with 4 Hgs.

		7	8	9	10	11	
39	A	138	171	153	155	145	av. 172 to .50
	B	140	173	152	152	145	" 168 " "

10/23/05.

*39

Make up two pockets each containing 2.5 g. reg. Hg mix and 1 g. reg. Fe mix well mixed together.

Assemble as Hgs with two charged Fes each, in 7% KOH.

Charge 15 hrs. @ .200. Discharge @ 100.

Results.

	1	2	3	4	5	6	
40 A	267	267	217	227	247	233	av. 230 to.50
B	270	268	210	228	238	225	" 230 "

Assembled each as 7/2 with 23 es.

	7	8	9	10	11	
40 A	62	61	33	32	37	av. 72 to.50
B	32	36	32	32	32	" 63 "

10/23/05.

*40

Two pockets just the same as *39 but assemble as 3 es with four charged 7/2 each in 71 o/o KOH. Charge 15 hrs. @ 200. Discharge @ 100.

Results.

41 2.42 A-H to .30V, 2.44 to 0.
E.M.F. 1.09, Av. P.D. .55

42 5.19 A-H to .30V, 5.19 to 0.
E.M.F. 1.09, Av. P.D. .54

43 8.95 A-H to .30V, 9.39 to 0.
E.M.F. 1.00, Av. P.D. .56

44 8.35 A-H to .30V, 8.39 to 0.
E.M.F. 1.00, Av. P.D. .56

45 4.91 A-H to .30V, 5.02 to 0.
E.M.F. 1.00, Av. P.D. .55

46 4.40 A-H to .30V, 4.45 to 0.
E.M.F. .99, Av. P.D. .53

11/4/05.

Experiments on Edison Primary Cell.

Use small Type B cells which are rated at 15 ampere-hours.
Use 200 cc. 21.9% KOH in glass tumblers and add the following:-
Discharge @ 500 m-a to 0 V.

*41 20 g. Ammonium Chloride

42 20 g. Ammonium Sulphate
Would not all dissolve.

43 20 g. Potassium Chlorate
Would not all dissolve.

44 20 g. K. Oxalate
Would not all dissolve.

45 18 g. K. Binoxalate.

46 20 g. K. Arsenate

Results.

47 Zn scaled off
11.33 A-H to .30V, 11.40 to 0. E.M.F. .85, Av.P.D. .51

48 Blue ppt. from Cu.
7.20 A-H to .30V, 7.27 to 0. E.M.F. .98, Av.P.D. .53

49 Blue ppt. then yellow. Zn scaled off in big pieces.
3.73 A-H to .30V, 3.76 to 0. E.M.F. .96, Av.P.D. .58

50 Blue ppt. from Cu.
6.15 A-H to .30V, 6.26 to 0. E.M.F. .97, Av.P.D. .56

51 Heavy brown oily ppt.
14.33 A-H to .30V, 14.69 to 0. E.M.F. .93, Av.P.D. .50

52 9.00 A-H to .30V, 9.17 to 0.
E.M.F. .95, Av.P.D. .56

53 Yellow ppt.
10.87 A-H to .30V, 11.14 to 0.
E.M.F. .95, Av.P.D. .54

54 1.01 A-H to .30V, 1.02 to 0.
E.M.F. 1.26, Av.P.D. .46

55 9.70 A-H to .30V, 9.94 to 0.
E.M.F. .94, Av.P.D. .54

47 20g Arsenite K

48 20g K Citrate

49 20g K Nitrate

50 20g Na Tartrate

51 20g Na Hyposulphite

52 20g K Persulphate
Would not all dissolve.

53 20g K Sulphite
Would not all dissolve.

54 20g K Manganate
Would not all dissolve. Dark green.

55 20g K Hypophosphite

Results.

56 9.65 A-H to 30V, 10.01 to 0.
E.M.F. .95, Av.P.D. .53

57 Solution lost its color on discharg.
Yellow scale formed on Zn.
2.87 A-H to 30V, 3.00 to 0. E.M.F. .605, Av.P.D. .43

58 Sol. lost color on discharg.
10.01 A-H to 30V, 10.16 to 0. E.M.F. .97, Av.P.D .55

59 Yellow scale formed on Zn.
E.M.F. .94 Res. to -.47 on 2 mins. Kept fluctuating between -.72 and -.40 Shaking caused it to approach 0.

60 6.50 A-H to 30V, 6.66 to 0
E.M.F. .96, Av.P.D. .54

61 6.42 A-H to 30V, 6.58 to 0.
E.M.F. .96, Av.P.D. .54

62 9.60 A-H to 30V, 9.67 to 0.
E.M.F. .955, Av.P.D. .55

63 9.58 A-H to 30V, 9.72 to 0.
E.M.F. .95, Av.P.D. .56

64 14.25 A-H to 30V, 17.87 to 0.
E.M.F. .96, Av.P.D. .42

56 20 g. Pyrophosphate Na.

57 20 g. K Cyanide. Yellow sol.

58 20 g. K Ferrocyanide. Yellow sol.
Would not all dissolve.

59 20 g. K Ferricyanide. Red-yellow
Would not all dissolve.

60 20 g. K Sulphocyanide

61 20 g. Sugar

62 Regular.
New copper supports oxidised.

63 Regular.
Copper supports cleaned by HNO_3

64 Regular but in 200 cc 20% Na OH instead of 21% KOH.

Results.

65 11.42 A-H to 30V, 11.55 to 0.
E.M.F. 1.04, Av. P.D. .55

67 Brown coating on Zn + powder on bottom of tumbler.
1.26 A-H to 30V, 1.28 to 0. E.M.F. 1.02, Av. P.D. .51

68 Black scale on Zn
2.25 A-H to 30V, 2.26 to 0. E.M.F. 1.06, Av. P.D. .56

69 Black scale on Zn
6.90 A-H to 30V, 6.92 to 0. E.M.F. 1.00, Av. P.D. .56

70 8.75 A-H to 30V, 8.88 to 0.
E.M.F. .96, Av. P.D. .53

71 10.40 A-H to 30V, 10.53 to 0.
E.M.F. .96, Av. P.D. .55

72 10.98 A-H to 30V, 10.88 to 0.
E.M.F. .96, Av. P.D. .54

73. Solution red-disk brown when dissolved. On diseleg. changed to bright yellow.
After dis. - Pearl gray. 11.79 A-H to 30V, 12.03 to 0.
E.M.F. .98 Av. P.D. .45

65 10 g. NH_4OH

66 10 g. Ammonium Bromide

67 20 g. Ammonium Carbonate

68 20 g. Ammonium Nitrate

69 2 g. Ammonium Vanadate

70 20 g. Chloride Na

71 5 g. Iodide K

72 10 g. Bromide K

73 5 g. Sulphide K

Results.

74 10.71 A-H to 30V, 10.96 to 0.
E.M.F. .96 Av. P.D. .53

75 10.71 A-H to 30V, 10.83 to 0.
E.M.F. .96 Av. P.D. .53

76 Black scale on Zn.
9.50 A-H to 30V, 9.57 to 0.
E.M.F. .94 Av. P.D. .55

77 Yellow sol. changed to greenish on discharg.
E.M.F. .33 Down to 0 in 1 minute

78 Yellow sol. changed to greenish on discharg.
E.M.F. .28 Down to 0 in 9 mins.

79 6.95 A-H to 30V, 7.04 to 0.
E.M.F. .95 Av. P.D. .55

80 White ppt. in bottom after discharg.
17.75 A-H to 30V, 19.02 to 0.
E.M.F. .96 Av. P.D. .50

81 10.71 A-H to 30V, 11.00 to 0.
E.M.F. .935 Av. P.D. .54

74 20 g. Fluoride Na
Would not all dissolve

75 20 g. Tungstate Na

76 20 g. Molybdate Na

77 20 g. Chromate K

78 20 g. Bichromate K

79 20 g. Orthophosphate K

80 10 g. Silicate Na

81 10 g. Stannate Na
Would not all dissolve

82 10 g. Sulphoarsenate Na

Results.

83 Orange red. sol. Square fast orange colored crystals on electrode + glass after discharg.
5.01 A-H to .30V, 5.06 to 0. E.M.F. 1.00 Av.P.D. .54

84 Yellow turbid sol.
9.42 A-H to .30V, 9.52 to 0.
E.M.F. .94 Av.P.D. .55

85 Cu passed when first on discharg.
8.76 A-H to .30V, 8.88 to 0.
E.M.F. .90 Av.P.D. .56

86 8.42 A-H to .30V, 8.55 to 0.
E.M.F. .95 Av.P.D. .53

87 .15 A-H to .30V, .16 to 0.
E.M.F. .91 Av.P.D. .64

88 11.27 A-H to .30V, 11.65 to 0.
E.M.F. .96 Av.P.D. .54

89 Decomposed ?
7.75 A-H to .30V, 7.97 to 0.
E.M.F. .95 Av.P.D. .54

90 5.23 A-H to .30V, 5.32 to 0.
E.M.F. .95 Av.P.D. .52

91 7.85 A-H to .30V, 8.00 to 0.
E.M.F. .95 Av.P.D. .55

83 10 g. Nitroprusside Na

84 10 g. Aldehyde

85 5 g. Formaldehyde

86 10 g. Formic acid

87 10 g. Trichloroacetic acid

88 10 g. Acetone

89 10 g. Manganic Sulphate
Would not all dissolve.

90 5 g. Aluminum

91 10 g. Glycerine

Results.

92 10.00 A-H to .30V, 10.16 to 0.
E.M.F. .95 Av.P.D. .55

93 8.00 A-H to .30V. 8.15 to 0.
E.M.F. .95 Av.P.D. .54

94 5.32 A-H to .30V, 5.46 to 0.
E.M.F. .95 Av.P.D. .54

95. Green sol. during dissolg. After dissolg. and stand, dense yellow sol.
14.19 A-H to .30V, 14.29 to 0. E.M.F. .95. Av.P.D. .53

96 21.00 A-H to .30V, 24.14 to 0
E.M.F. .96 Av.P.D. .51.

97 E.M.F. .92, Av.P.D. .50
A-H to 0V. 1.125

98 E.M.F. .88 Av.P.D. .48.
A-H to 0V. 1.09

99 E.M.F. .88 Av.P.D. .48.
A-H to 0V. .858

100 E.M.F. .86 Res. in one minute

92 10 g. Ethyl Alcohol.

93 10 g. Methyl Alcohol

94 20 g. Borax

95 10 g. Sulphur
Would not all dissolve.

96 200 cc. 33 % KOH solution.

97 200 cc. 10 % KOH + 20 g Na Hyposulphite

98 Same + 30 g. Na Hyposulphite

99 Same + 40 g. Na. Hyposulphite

100 200 cc. 5 % KOH + 30 g. Na Hyposulphite

Results.

101	E.M.F. .86 Ran in one minute.	101 200 cc. 5% KOH + 40 g Na Hyposulphite
102	E.M.F. .48 Ran 3½ min. to 0 V.	102 200 cc H_2O + 50 g Na Hyposulphite
103	16.34 A-H to 30 V, 17.26 to 0. E.M.F. .96, Av.P.D. .48	103 200 cc 20% NaOH
104	15.56 A-H to 30 V, 18.36 to 0. E.M.F. .96, Av.P.D. .44	104 200 cc 20% NaOH
105	18.67 A-H to 30 V, 19.11 to 0 E.M.F. .96, Av.P.D. .53	105 200 cc 28% KOH
106	Brown ppt. Looks like coffee. 17.00 A-H to 30 V, 17.86 to 0. E.M.F. .96, Av.P.D. .46	106 200 cc 20% NaOH + 20 g Na Hyposulphite
107	After dis. lower part of sol. was heavy like glycerine and of a light brown color. 14.00 A-H to 30 V, 19.86 to 0. E.M.F. .98, Av.P.D. .38	107 Same NaOH + 10 g Na Silicate
108	Sol. was clear orange colored on top and turbid greenish-yellow below. Changed to dense yellow all through. 10.16 A-H to 30 V, 10.18 to 0. E.M.F. .96, Av.P.D. .49	108 Same NaOH + 10 g Sulphur
109	E.M.F. .48 Would not run at all. Drop of about 3.5 volts between electrodes at 500 ma.	109 200 cc H_2O + 30 g Na Silicate

Results.

110 White powder on bottom after discharg.
17.39 A-H to .30 V, 18.70 to 0.
E.M.F. .96 Av. P.D. .50

111 Bluish-black ppt. on dis. Cu blackened.
6.17 A-H to .30 V, 6.37 to 0
E.M.F. 1.12 . Av. P.D. .49

112 Bluish-black ppt. Cu blackened.
12.50 A-H to .30 V. 14.39 to 0.
E.M.F. .98 . Av. P.D. .45

113 Slight brown ppt.
16.50 A-H to .30 V, 17.95 to 0.
E.M.F. .97 Av. P.D. .47

114 Slight brown ppt.
17.14 A-H to .30 V, 19.13 to 0.
E.M.F. .97 Av. P.D. .47

115 On dis. sol. clear green on top, yellow tinted on bottom.
15.75 A-H to .30 V, 19.97 to 0. E.M.F. .965, Av. P.D. .42

116 15.50 A-H to .30 V, 19.22 to 0.
E.M.F. .965 Av. P.D. .44
2 Holes eaten right through Cu.

117 Brown ppt.
15.00 A-H to .30 V, 17.02 to 0.
E.M.F. .965 Av. P.D. .45

118 14.89 A-H to .30 V. 18.38 to 0.
E.M.F. .965 Av. P.D. .42

110 10 g Na Silicate. Duplicate of 80.

111 20 g Sulphocyanide of Ammonia.

112 200 cc. 20 % NaOH + 10 g Sulphocyanide of Ammonia

113 Same NaOH + 10 g Na Hyposulphite

114 Same NaOH + 5 g Na Hyposulphite

115 Same NaOH + 2 g Sulphur

116 Same NaOH + 5 g KOH

117 Same NaOH + 2 g Na Hyposulphite

118 Same NaOH + 5 g Na Silicate

119	Brown ppt.	119 Same NaOH + 5g Na Silicate + 2g Hyposulphite
	16.00 A-H to .30V, 18.64 to 0.	
	E.M.F. .965 Av.P.D. .44	
120	11.15 A-H to .30V, 11.78 to 0.	120 200 cc. 15 o/o NaOH.
	E.M.F. .96 Av.P.D. .51	
121	15.58 A-H to .30V, 17.73 to 0.	121 Same + 10 g Na Silicate
	E.M.F. .96 Av.P.D. .45	Would not all dissolve.
122	8.79 A-H to .30V, 8.85 to 0	122 200 cc. 21 o/o KOH.
	E.M.F. .95 Av.P.D. .57	
123	18.25 A-H to .30V, 19.61 to 0	123 Same + 20 g Na Silicate
	E.M.F. .97 Av.P.D. .49	Would not all dissolve
124	15.58 A-H to .30V, 16.73 to 0	124 Same + 5 g Na Silicate
	E.M.F. .96 Av.P.D. .51	Would not all dissolve
125	Brown ppt. then white on top of it	125 Same + 10 g Na Silicate + 5 g Hyposulphite
	16.09 A-H to .30V, 17.35 to 0	Would not all dissolve
	E.M.F. 95.5 Av.P.D. .51	
126	15.25 A-H to .30V, 18.21 to 0.	126 200 cc 20 o/o NaOH + 1 g Sulphur
	E.M.F. .96 Av.P.D. .49	Would not all dissolve
127	6.91 A-H to .30V, 7.98 to 0	127 200 cc SiOH solution 10 o/o
	E.M.F. .96 Av.P.D. .42	Would not all dissolve – probably 6 to 8 o/o.

128 E.M.F. 1.04 0 in 2 minutes.

129 E.M.F. 1.17 Would not run

130 14.86 A-H to 30V, 20.18 to 0
E.M.F. .96 Av.P.D. .45

131 10.82 A-H to 30V, 12.70 to 0
E.M.F. .965 Av.P.D. .48

132 E.M.F. 1.18 Would not run.

133 E.M.F. 1.16 Would not run

to #148

Note – From here on, used commercial water glass (semi-liquid) instead of crystals of Na Silicate. Amount stated was dissolved in 200 cc of electrolyte and then 200 cc of the double solution was used in cell.

128 10 % NaOH + 20 g Na Silicate

129 Same + 50 g Na Silicate
Flocculent

130 20 % NaOH + 20 g Na Silicate

131 Same + 50 g Na Silicate

132 10 % KOH + 20 g Na Silicate

133 Same + 50 g Na Silicate
Flocculent

12/15/05

134 19.60 A-H to 30V, 21.64 to 0
E.M.F. .97 Av.P.D. .48

135 9.13 A-H to 30V, 9.24 to 0
E.M.F. .98 Av.P.D. .51

136 E.M.F. .71 (?) Would not run

137 16.50 to 30V, 17.58 to 0
E.M.F. .98 Av.P.D. .47

138 16.53 to 30V, 18.12 to 0
E.M.F. .96 Av.P.D. .44
Peculiar curve

139 21.50 to 30V, 22.78 to 0
E.M.F. .965 Av.P.D. .49

140 16.46 to 30V, 16.87 to 0
E.M.F. .98 Av.P.D. .52

141 17.75 to 30V, 19.33 to 0
E.M.F. .99 Av.P.D. .50

142 18.83 to 30V 20.56 to 0
E.M.F. .995 Av.P.D. .48

134 21% KOH + 20 g Na Silicate

135 Same + 50 g Na Silicate

136 5% NaOH super-saturated with Na Silicate by heating (150 g?)

137 200 cc 20% NaOH neg.

138 Same + 15 g K Silicate wet

139 21% KOH + 15 g K Silicate wet

140 Same KOH + 5 g Na Silicate

141 Same KOH + 10 g Na Silicate

142 Same KOH + 15 g Na Silicate

143	20.66 to .30 V, E.M.F. 1.10	22.32 to 0 Av.P.D. .47	143 Same KOH + 20 g. Na Silicate
144	18.50 to .30 V, E.M.F. .96	20.29 to 0 Av.P.D. .46	144 20 % NaOH + 5 g. Na Silicate
145	19.75 to .30 V, E.M.F. .965	20.21 to 0 Av.P.D. .44	145 Same NaOH + 10 g. Na Silicate
146	19.48 to .30 V, E.M.F. .965	20.54 to 0 Av.P.D. .43	146 Same NaOH + 15 g. Na Silicate Slight weight CuO
147	29.31 to .30 V, E.M.F. .995	30.00 to .08 V. Av.P.D. .51	147 21 % KOH in excess - 800 cc.
148	15.87 to .30 V, E.M.F. .96	16.91 to 0 Av.P.D .51	148 21 % KOH + 5 g K Silicate dry - Merck.
149	15.91 to .30 V., E.M.F. .985	18.85 to 0 Av.P.D. .45	149 20 % NaOH + 2 g K Silicate dry.
150	16.93 to .30 V, E.M.F. .99	19.50 to 0. Av.P.D. .45	150 Same NaOH + 5 g K Silicate dry.
151	9.60 to .30 V, E.M.F. 1.955	9.64 to 0 Av.P.D. .54	151 Cy. peroxidized by current 14 hrs. @ .700 amps. Assembled with regular zinc in 700 cc. 21 % KOH. New CuO

12/15/05.

152	13.50 to .30V,	16.38 to 0
	E.M.F. 1.16	P.D. – See curve.
153	7.75 to .30V.	15.50 to 0.
	E.M.F. 1.13	P.D. – See curve
154	4.50 to .30 V,	8.62 to 0
	E.M.F. .92	Av. P.D – See curve
155	6.00 to .30V,	10.50 to 0
	E.M.F. .93	P.D. – See curve
156	8.39 to .30V,	16.54 to 0
	E.M.F. .915	P.D. – See curve
157	8.87 to .30V.	18.62 to 0.
	E.M.F. .98	P.D. high .5 A-H
158	14.75 to .30V,	18.50 to 0
	E.M.F. .99	P.D. high 5 ½ A-H

12/19/05.

152 Cu from #146 oxidized by current in 20% KOH – 2 amps for 12 hrs.

153 Cu from 147 oxidized by current in 20% KOH – .5 amps for 24 hrs.

154 Cu from 145 dipped in fused NaOH 5 min.

155 Cu from 148 dipped in fused NaOH 10 min

156 Cu from 142 in fused NaOH with current – 2.5 amps for 10 min.

157 Cu from 143 allowed to self-heat in air after washing

158 Cu from 144 heated gently while self-heating in air, after washing

The above nos. 157 – 158 all to be assembled with regular Zincs and run each in 200 c.c. of 20 % NaOH.

159	20.62 to .30V, E.M.F. .965	22.62 to 0 Av.P.D. .46	159 21% KOH + 20 g. Na Silicate
160	20.25 to .30V, E.M.F. .965	22.09 to 0 Av.P.D. .47	160 Same KOH + 25 g. Na Silicate
161	21.50 to .30V, E.M.F. .97	22.46 to 0. Av.P.D. .48	161 Same KOH + 30 g. Na Silicate
162	20.75 to .30V, E.M.F. .96	22.16 to 0. Av.P.D. .51	162 21% KOH + 10 g. K Silicate dry
163	21.30 to .30V, E.M.F. .96	23.46 to 0. Av.P.D. .49.	163 Same KOH + 15 g. K Silicate dry
164	25.50 to .30V, E.M.F. .96	27.18 to 0 Av.P.D. .48	164 Same KOH + 20 g. K Silicate dry
165	15.25 to .30V, E.M.F. .96	16.17 to 0 Av.P.D. .46	165 15% NaOH + 20 g. Na Silicate
166	17.37 to .30V., E.M.F. .955	19.84 to 0 Av.P.D. .46	166 Same NaOH + 15 g. K Silicate dry

12/19/05.

167	24.25 to 30V,	26.69 to 0.	
	E.M.F. .965	Av.P.D. .49	
168	22.19 to 30V,	29.21 to 0.	
	E.M.F. .97	Av.P.D. .49	
169	22.62 to 30V,	29.50 to 0	
	E.M.F. .975	Av.P.D. .48	
170	24.00 to 30V,	29.25 to .06 V.	
	E.M.F. .965	Av.P.D. .48	
171	20.59 to 30V,	22.65 to 0	
	E.M.F. .975	Av.P.D. .49	
172	20.78 to 30V,	22.24 to 0.	
	E.M.F. .101	Av.P.D. .49	
173	25.75 to 30V,	29.25 to 0.11 V.	
	E.M.F. .96	Av.P.D. .49	
174	23.00 to 30V,	27.69 to 0	
	E.M.F. .96	Av.P.D. .50	

12/21/05.

167 21% KOH + 20g. K Silicate dry.

168 Same KOH + 25g K Silicate

169 Same KOH + 30g. K Silicate

170 Same KOH + 35 g. K Silicate

171 18% KOH + 20g. K Silicate

172 Same KOH + 30g. K Silicate

173 24% KOH + 20g K Silicate

174 Same KOH + 30g. K Silicate

175 20.75 to .30V, 24.75 to 0.
E.M.F. 1.085 Av.P.D. .52 Curve O.K.

176 11.14 to .30V, 24.50 to 0
E.M.F. 1.085 Av.P.D. .64

177 11.45 to .30V, 24.33 to 0
E.M.F. 1.00 Av.P.D. .55

178 20.25 to .30V, 25.02 to 0.
E.M.F. .985 Av.P.D. .52 State high

179 6.68 to .30V, 25.33 to 0.
E.M.F. .845 Av.P.D. .52

12/21/05.

175 Cu*137 – Rinse in H_2O. Soak in 33 % KOH. Self-heat.

176 Cu 158 – Wash and repeat treatment.

177 Cu 159 – Wash + self-heat.

178 Cu 161 – Self-heat just as it comes out of cell.

179 Cu 160 – Assemble with new Zn and in new solution + run.

The above nos. 175 – 179 are to be assembled with new zincs each in 200 cc 33 % KOH and run regular.

180 14.25 to .30 V.
E.M.F. .965 Av.P.D. 4 A-H high

181 14.91 to .30 V.
E.M.F. .985 Av.P.D. 5 A-H high

182 14.17 to .30 V.
E.M.F. 1.015 Av.P.D. .56

183 10.75 to .30 V
E.M.F. .96 Av.P.D. 3 A-H high - See curve

184 15.17 to .30 V, 18.43 to 0
E.M.F. 1.00 Av.P.D. .53

185 10.00 to .30 V
E.M.F. .965 Av.P.D. .67

186 15.32 to 0 Av.P.D. .30
See curve E.M.F. .96

187 9.81 to .30 V.
E.M.F. .98 Av.P.D. .58

12/27/05

180 Cu* 163 taken out and ox quickly using gentle heat.

181 Cu* 164 taken out + S-H slowly.

182 Cu* 173 washed, soaked in hot very conc. KOH for few min, then S-H. Would not S-H so washed KOH out.

183 Cu* 174 washed, soaked in conc. KOH cold. Then S-H.

184 Cu* 175 Repeat treatment.

185 Cu* 178 Repeat treatment.

186 Cu* 167 taken out and dipped directly in hot 33 o/o. - then S.H.

187 Cu* 168 taken out and heated up over Bunsen burner.

Run 180 - 187 each in 200 cc of 33 o/o KOH solution.

188	14.63 to .30 V,	14.71 to 0.	
	E.M.F. .945	Av.P.D. .53	
189	15.50 to .30 V,	17.57 to 0	
	E.M.F. .95	Av.P.D. .50	
190	35.31 to .30 V.		
	E.M.F. .975	Av. P.D. .52	
191	17.64 to .30 V,	19.54 to 0	
	E.M.F. .96	Av.P.D. .49	
192	9.31 to 30 V,	9.67 to 0.	
	E.M.F. .95	Av.P.D. .52	
193	18.75 to .30	22.04 to 0	
	E.M.F. .96	Av.P.D. .51	
194	12.00 to .30	13.95 to 0.	
	E.M.F. .95	Av.P.D. .45	
195	E.M.F. .96	8.5 A-H to 0	
	See curve		
196	18.56 to .30 V,	20.15 to 0.	
	E.M.F. .96	Av.P.D. .49	

12/27/05.

188 200 cc. 21 o/o KOH + 20 g of Na Hydrofluorosilicate

189 200 cc. 20 o/o NaOH + 20 g of Na Hydrofluorosilicate

190 21 o/o KOH. + 30 g. K Silicate using type J. ground 1½ CuO.

191 200 cc 25 o/o NaOH.

192 Reg. 21 o/o KOH, 200 cc. Run cold (About 12°C av.)

193 33 o/o KOH – Run cold (About 12°C. av.)

194 20 o/o NaOH – Run cold (About 12°C. av.)

195 25 o/o NaOH – Run cold (About 12°C av.)

196 21 o/o KOH + 20 g K Silicate Run cold (About 12°C av.)

197 16.86 to 30V, 18.43 to 0
E.M.F. .96 Av.P.D. .49

198 11.00 to 30V, 14.33 to 0
E.M.F. .96 Av.P.D. .41

199 11.75 to 30V,
E.M.F. .96 Av.P.D. .62

200 6.70 to 30V.
E.M.F. .96 Av.P.D. .70

201 12.00 to 30V.
E.M.F. .975 Av.P.D. .62

202 12.81 to 30V.
E.M.F. .95 Av.P.D. .55 - 3.5 A-H high

203 12.12 to 30V.
E.M.F. .97 Av.P.D. .53 - 3 A-H high

204 12.25 to 30V.
E.M.F. .96 Av.P.D. .52 - 1.5 A-H high

205 12.50 to 30V.
E.M.F. .96 Av.P.D. .60 - 6.5 A-H high

Run 197 — 205 — ~33% KOH

197 21% KOH + 20g. Na Silicate
Run cold (About 12°C av.)

198 20% NaOH + 10g. Na Silicate
Run cold (About 12°C av.)

1/3/06

199 Cu# 181 Repeat treatment

200 Cu# 184 Repeat treatment

201 Cu# 185 Repeat treatment

202 Cu# 193 S-H req.

203 Cu# 190 S-H req.

204 Cu# 191 S-H req.

205 Cu# 195 H_2O_2 + KOH

206 15.85 to 30V. (4 A-H) 8 hrs. cold (0°C.)

207 26.69 to 30V. 15 A-H cold (-8 to +8°)
Drop of 7° in temp caused drop of .08 volts

208 25.69 to 30V. 14 A-H cold (-8 to +8°)
7° drop = .12 volts drop. Smoked curve
After discharg. white dep. ++

209 26.13 to 30V. 14 A-H cold
7° drop = .12 volts drop.

210 19.00 to 30V. 7 A-H cold
7° drop = drop to 0

211 19.96 to 30V. 8 A-H cold

After discharg. white dep. ++++ 3 owned on p.

212 23.00 A-H to 30V. 11 A-H cold
7° drop = .12 volts drop.
After discharg. white dep. +++

213 22.12 to 30V. 10.5 A-H cold
7° drop = .18 volts drop
After discharg. white dep. ++

214 25.62 to 30V. 14 A-H cold
7° drop = .06 volts drop.
After discharg. white dep. +

1/3/06

206 20 o/o NaOH neg. Run cold

207 33 o/o KOH neg. Run cold

208 21 o/o KOH + 20 g. K Silicate
Run cold

209 Same KOH + 40 g. K Silicate
Run cold

210 Same KOH + 60 g. K Silicate
Run cold H_2O caused white dep.

211 Same KOH + 15 g. Na Silicate
Run cold (Na Silico Marble crystals now.)

212 Same KOH + 30 g. Na Silicate
Run cold

213 Same KOH + 45 g. Na Silicate
Run cold - H_2O caused white dep.

214 24 o/o KOH + 10 g. K Silicate
Run cold

215 27.00 to .30V. 15 N-H cold
7° drop = .06 volts drop

216 10.91 to .30V. 11.03 to 0
E.M.F. .955 Av.P.D. .55

218 E.M.F. 1.10 Dropped to 0 when first put on discharg. – then came up room. Av.V. .50 which is lower than neg. ox.
219 12.44 to .30V. 13.86 to 0.
E.M.F. .95 Av.P.D. .49

215 24 o/o KOH + 20 g K Silicate
Run cold

The above nos. 206 – 215 all to have J zincs and special heavy B oxides (made 1½ length)
Na Silicate now used as Nerch's crystals.

216 21 o/o KOH + 20 g K Silicofluoride

217

218 New Oxide soaked in $CuSO_4$ sol. then KOH to ppt. $Cu(OH)_2$ in pores. Type B
33 o/o KOH
219 90 cc. of Solution mixed for Boodie which was 24 o/o KOH containing 30 g. Na Sil. to 200 cc.

220 14.88 to .30V, 15.30 to 0.
E.M.F. .92 Av.P.D. .50

221 26.00 to .30V, 28.43 to 0.
E.M.F. .97 Av.P.D. .49
White dep. after discharg about $\frac{1}{16}$"

222 30.23 to .30V,
E.M.F. .99 Av.P.D. .48

223 30.00 to .30V, 32.50 to 0.
E.M.F. .985 Av.P.D. .49

224 22.80 to .30V, 23.56 to 0.
E.M.F. .995 Av.P.D. .48

225 19.83 to .30V, 18.26 to 0
E.M.F. .995 Av.P.D. .49

226 10.00 to .30V, See curve.
E.M.F. 1.00 Av.P.D. .46
Discharg. cont @ .5 amp. after coming to
@ 1 amp. 1 hour 19.25 total.

1/5/06.

J. Electrodes (noted at 50 amp-hrs.) will now be used, except when otherwise noted, — in 200 cc of electrolyte.
Discharg. rate now — 1 ampere.

220 20 g. NaOH reg.

221 20 g. KOH + 20 g. K Silicate

222 Same KOH + 30 g. K Silicate

223 Same KOH + 40 g. K Silicate

224 Same KOH + 50 g. K Silicate

225 Same KOH + 60 g. K Silicate

226 Same KOH + 70 g. K Silicate

227 E.M.F. 1.00 Came to 0 in 15 min.
@ 1 amp. Cont. discharg @ .5 amp. and
it took 12.10 A-H at this rate.

228 24.00 A-H to .30V, 24.83 to 0.
E.M.F. .95 Av. P.D. .48
White dep. after discharg about $\frac{1}{4}$"

229 26.23 to .30V, 28.25 to 0.
E.M.F. .935 Av. P.D. .48
White dep. after discharg about $\frac{1}{16}$".

230 26.00 to .30V, 27.50 to 0.
E.M.F. .935 Av. P.D. .47
White dep. after discharg - little

231 27.00 to .30V, 29.50 to 0.
E.M.F. .93 Av. P.D. .46

227 Same KOH + 80 g. K Silicate

228 Same KOH + 20 g. Na Silicate
E + A. dry crystals.

229 Same KOH + 30 g. Na Silicate

230 Same KOH + 40 g. Na Silicate

231 Same KOH + 20 g K + 20 g Na Sil

233 15.42 to .30 V.
E.M.F. .96 Av.P.D. .54

234 1.44 to .30 V.
P.D. high

235 2.95 to .30 V.
P.D. ½ high

236 1.35 to .30 V.
P.D. high quickly

1/10/06.

Try reoxidizing exhausted Cu oxides with the following oxidizing agents —

Use B oxides and discharge in 200 cc. 33 % KOH @ 500 m-a.

232 Na Hypochlorite

233 Si Hypochlorite
Cu # 196

234 Ca Hypochlorite (Bleaching powder in water.)
Cu # 169

235 K Permanganate
Cu # 170

236 K Ferricyanide
Cu # 171

237 Na Plumbate

238 K Ferrite

239 8.62 to .30 V
E.M.F. .98 P.D high. 1. A-H

240 13.06 to .30 V.
E.M.F. .965 Av.P.D. .55 - .5 A-H high

241 23.17 to .30 V, 24.75 to 0
E.M.F. .965 Av.P.D. .53 reg.

239 H_2O_2 in water
Cu* 172

240 H_2O_2 in KOH.
Cu* 177

241 This one to be a new Cu oxide treated with H_2O_2 in water.

242.

243

244.

245

246

247	28.33 to 30V.	30.75 to 0.
	E.M.F. .985	Av.P.D. .47
	Sol. pink after stand. * See note in back	
248	29.56 to 30V.	32.13 to 0
	E.M.F. .99	Av.P.D. .46
	Sol. white after stand.	
249	32.40 to 30V.	34.47 to 0
	E.M.F. 101	Av.P.D. .47
	Sol. green-yellow after stand.	
250	17.30 to 30V.	17.75 to 0.
	E.M.F. .965	Av.P.D. .55
251	28.97 to 30V.	29.47 to 0.
	E.M.F. .97	Av.P.D. .51
	Sol. pink slightly after stand.	
252	30.00 to 30V	30.63 to 0
	E.M.F. .97	Av.P.D. .51
	Sol. pink very little after stand.	
253	23.30 to 30V.	23.77 to 0
	E.M.F. 97.5	Av.P.D. .55
254	31.63 to 30V.	32.31 to 0
	E.M.F. .98	Av.P.D. .505
255	31.21 to 30V	31.73 to 0
	E.M.F. .98	Av.P.D. .505

247 21 % KOH + 25 g K Silicate of Finer + Amerch's. J' Electrodes reg.

248 Same KOH + 30 g. K Silicate

249 Same KOH + 35 g. K Silicate

250 27 % KOH

251 Same KOH + 10 g. K Silicate

252 Same KOH + 20 g. K Silicate

253 33 % KOH

254 Same KOH + 10 g. K Silicate

255 Same KOH + 20 g. K Silicate

256	25.21 to 30V.	25.80 to 0	256 24 % KOH + 20 g Na Silicate of Merck's. (Pure crystl.)
	E.M.F. .98	Av. P.D. .51	
257	26.78 to 30V.	27.67 to 0	257 Same KOH + 30 g Na Silicate
	E.M.F. .98	Av. P.D. .51	
258	28.73 to 30V.	29.33 to 0	258 Same KOH + 40 g Na Silicate
	E.M.F. .99	Av. P.D. .49	
259	27.28 to 30V	27.98 to 0	259 27 % KOH + 20 g Na Silicate
	E.M.F. .98	Av. P.D. .50	
260	29.75 to 30V.		260 Same KOH + 30 g Na Silicate
	E.M.F. .98	Av. P.D. .49	
261	29.00 to 30V.	30.16 to 0	261 Same KOH + 40 g Na Silicate
	E.M.F. .985	Av. P.D. .48	
262	30.00 to 30V.		262 30 % KOH + 20 g Na Silicate
	E.M.F. .98	Av. P.D. .50	
263	31.25 to 30V.		263 Same KOH + 30 g Na Silicate
	E.M.F. .98	Av. P.D. .50	
264	29.81 to 30V.	30.41 to 0	264 Same KOH + 40 g Na Silicate
	E.M.F. .985	Av. P.D. .50	

*See note in Journal

265 Swelled from .089" to .124" = .035"
2.6 hrs. high V. – 3 hrs. norm. – 3.3 hrs. polarized
Very peculiar curve
266 3.3 hrs. high – 9.5 hrs. norm. –

267 1.3 hrs. high – 11.5 hrs. norm –
13.75 m-a-h to .30V. highest one.

268 15 min. extra high volts – 1.25
5 hrs. high – 1 hr. norm. – 7 hrs. pol.

269 25 min. extra high volts – 1.20
3 hrs. high – 1 hr. norm. – 5 hrs. pol.

270 5 hrs. norm. – 14 hrs. pol.

271 1.75 55 A-H to .30V. Good reg. curve.
E.M.F. 1.08 Av. P.P. .55 V.

272 4 hrs. pol – 15 hrs. norm.
E.M.F. 1.46.

1/25/06.

$Cu(OH)_2$ made by Greenly, in reg. storage battery cups.

#265 Plain 4 g. cake, 21 o/o KOH. 80 g. Discharge @ 100 mil-amps. Pressure 75 at S.P. – 100 con.
266 Plain 4 g. cake. 10 o/o KOH.

267 Plain 4 g. cake. 33 o/o KOH.

268 8 + 2 mix with graphite. 4 g. cake. 24 o/o KOH.

269 7 + 3 mix with graphite. 4 g. cake. 21 o/o KOH.

270 Plain 3.5 g. cake. 21 o/o KOH Greenly's #2 batch.

2/2/06.

271 Plain 4 g. 40 at. S.P. + Con. 21 o/o KOH

272 Plain 4 g. 200 at. S.P. + Con. 21 o/o KOH.

273 10 hrs. at .80 volts, 4 hrs. norm.
E.M.F. 1.65

274 10.5 hrs. at .78 volts, 3 hrs. norm
E.M.F. 1.54

275 Run at 0 - .04 V. for 3 hrs. then reversed.
E.M.F. 1.11

276 4 hrs high - 3 norm. - 3.5 pick.
E.M.F. 1.62

277 7.5 hrs high - 3 norm.
E.M.F. 1.38

278 2.5 hrs. high - 8 norm.
E.M.F. 1.12

280 4 hrs. high - 14.5 norm.
E.M.F. 1.18.

281 20.56 A-H to .30 V. Reg. crime
E.M.F. 1.00 A.H.P.D. .62

273 8+2 mix with graphite. 4 g cake
50 at. S.P. + Corr. 21% KOH

274 8+2 mix with ½ flake. 4 g cake
50 at. S.P. + Corr. 21% KOH

275 Plain 4 g. 50 at S.P. + Corr.
Alcoholic solution KOH

276 7+3 mix with graphite, moistened with water. 50 at S.P. + Corr. 4 g cake
21% KOH.

277 Same as 276 but moisten mix with KOH.

278 Same as 277 then put pockets in KOH + bring up nearly to boil

279 Same as 277 in copper plated pockets

280 Half + half mix with black oxide. 50 at. 4 g cake. 21% KOH.

281 Black oxide mixed 8+2 with graphite dry. 75 at. 4 g cake. 21% KOH

1/19/06.

Special Dry Cells.

282 Opened top of new "Ever-Ready" cell and soaked in H_2O for about 50 hrs. to get out the NH_4Cl. Then dried + poured in 21% KOH + Sil.

283 Took the black mixture out of a dry cell and washed it thoroughly. Also washed cell + blotting paper. Then when mix was dry, packed it back in cell + put in 120 cc. 21% KOH + Sil.

284 Used Zn case from new "Velco" cell. BOxide. Absorber - Mg_2O. Solution 24% KOH + 30 g Sil to 200 cc. Took 320 cc. of solution.

285 Zn case from new "Star" cell. BOxide. Absorber charcoal. Solution 24% KOH + 30 g Sil to 200 cc. Took 200 cc. solution.

286 7.00 A-H to O, cold + 9.93 normal =
16.93 A-H. total. Av. P.D. cold = .42 V.

287 19.83 A-H to O, cold + 3.75 normal =
23.58 A-H total. Av. P.D. cold = .42 V.

288 15.61 A-H to O, cold + 13.31 normal =
28.92 A-H total. Av. P.D. cold = .41 V.

289 25.21 A-H to O, cold + 4.10 normal =
29.31 A-H total. Av. P.D. cold = .38 V.

290 17.23 A-H to O, cold + 7.51 normal =
24.74 A-H total. Av. P.D. cold = .42 V.

291 18.41 A-H to O, cold + 7.06 normal =
25.47 A-H total. Av. P.D. cold = .38 V.

292 17.78 A-H to O, cold + 6.98 normal =
24.76 A-H total. Av. P.D. cold = .41 V.

293 24.63 A-H to O, cold + 1.13 normal =
25.76 A-H total. Av. P.D. cold = .39 V.

294 20.61 A-H to O, cold + 6.40 normal =
27.01 A-H total Av. P.D. cold = .37 V.

2/3/06

286 20 % NaOH (200 cc). J Electrodes

287 33 % KOH.

288 21 % KOH + 30 g K Sil.

289 27 % KOH + 20 g K Sil.

290 24 % KOH + 20 g Na Sil.

291 Same KOH + 30 g Na Sil.

292 Same KOH + 40 g Na Sil.

293 27 % KOH + 20 g Na Sil.

294 Same KOH + 30 g Na Sil.

295 23.83 A-H to 0, cold + 1.43 normal =
25.26 A-H. total. Av. P.D. cold = .39 V.

296 22.68 A-H to 0, cold + .86 normal =
23.54 A-H total Av. P.D. cold = .40 V.

297 22.75 A-H to 0, cold + .56 normal =
23.31 A-H total Av. P.D. cold = .39 V.

298 22.60 A-H to 0. cold + 1.50 normal =
24.10 A-H total. Av. P.D. cold = .36 V.

295 Same KOH + 40 g. Na Sil.

296 30 % KOH + 20 g. Na Sil.

297 Same KOH + 30 g. Na Sil.

298 Same KOH + 40 g. Na Sil.

The above numbers 286 – 298 are to be run cold at 1 amp. until they all reach 0. Then bring them in room and when they have gotten up to ordinary room temperature, continue discharge at same rate.

Na Silicate used was not (dehydrated) except in 291 + 293. (Nyselis).

Cold temperature averaged about 1 °C. (–3 to +10° variation).

E.M.F. .88 4.9 A-H to 0. Av. P.D. .71

299 Sol. blue at top – Cu is soluble + is ppt. by Zn. White crystals also form on Zn which are not very sol. in H_2O.

300 Same as 299.
E.M.F. .84 7.42 A-H to 0 Av. P.D. .74

301 Sol. reacts with NH_4Cl, Cu sol.
E.M.F. .94 – Reached .20 V in ½ hr. and 0 in 4 hours

302 68.435 g. – 46 = 22.435 g. used
19.43 A-H to 0 = .866 A-H per g.
= 1.154 g. per A-H.

303 65.80 g. – 52.18 = 13.62 g. used
11.28 A-H total = .828 A-H per g.
= 1.207 g. per A-H.

304 67.94 g. – 44.08 = 23.86 g. used
20 A-H total = .838 A-H per g.
= 1.193 g. per A-H.

305 50.72 g.

306 50.11 g.

307 49.65 g.

Soln. of NaOH
& short circuit Zn
for KOH, Increase
540 m-a-h. in second
2 hr. O.K. in second
2 hr. O.K.

2/20/06.

299 200 cc 15 o/o NH_4Cl in type B Salonde. Discharge @ 500 ma

300 200 cc 25 o/o NH_4Cl in type B Salonde.

301 200 cc 15 o/o NH_4Cl + 20 g Na Sil. B Salonde

302 Weigh B. Zinc carefully – Then run in 200 cc 20 o/o NaOH to 30 V. + weigh again

303 The same in 21 o/o KOH.

304 The same in 33 o/o KOH.

305 Weigh B. Oxide carefully – Then run in excess of 20 o/o NaOH + Zn till curve shows oxide reduced

306 Same in 21 o/o KOH.

307 Same in 33 o/o KOH

Results.

308

309

310

311

308 Make CuO pocket and assemble on negative side with 2 Ni's on positive. Chg 1 min @ 100 m-a in 21 o/o KOH. CuO 6 g.

309 Make Fe - CuO cell, - CuO on positive side. Chg Fe against strips. Run @ 100 m-a. 21 o/o KOH. CuO 6 g.

310 Make Zn - NiO_2 cell, - Chg. Ni against ~~strips~~ Zn. Run @ 100 m-a. 21 o/o KOH.

311 Make Al - NiO_2 cell. Chg Ni then spot Al in and run @ 100 m-a. 21 o/o KOH.

Made 2 cells for each number.

10 o/o Paraffine good. Not porous. Still brittle but not so much as asphalt alone. Paraffine prevents the formation of bubbles.

As per cent of ~~asphalt~~ Paraffine increases brittleness decreases and cakes get tough but soft. 314 + 315 are even somewhat elastic.

None of these stick to zinc well.

3/1/06.

For Sealing Cell.

Mix substances in given proportions, cast into cakes and test mechanically, and chemically for solubility. Also test for adhesion to zinc.

312	10 o/o Paraffine	
	90 o/o Asphalt (Hard Mexican)	
313	20 o/o Paraffine	
	80 o/o Asphalt	"
314	30 o/o Paraffine	
	70 o/o Asphalt	"
315	40 o/o Paraffine	
	60 o/o Asphalt	"

Substances alone –

Paraffine

Hard Mexican Asphalt

316 Pretty good; pliable; tough
Sticks to wire well.
Soluble — Soaked in 33% HCl
one week + solution was slightly
yellow.

317 Pliable and tough but
rather soft.
Soluble — Same as #316.

318 Too soft

3/27/06.

Substances —
Paraffine
Soft Mexican Asphalt

316 5% Paraffine
95% Asphalt

317 10% Paraffine
90% Asphalt

318 20% Paraffine
80% Asphalt

3/2/06.

Substances

Different kinds of Asphalt alone, for comparison with mixes.

319 Hard Mexican

320 Soft Mexican

321 Hard Cuban

322 Prime Cuban

323 Crude Trinidad

319 Not strong; very brittle – About like "Prime Cuban."

In 33% KOH one week – sol. colorless.

320 Soft, sticky, somewhat elastic. Rather stronger than hard Mex. Sticks to zinc very well.

In 33% one week – sol. dark brown-yellow

321 Strong, hard, + somewhat porous. Dull appearance. Does not stick to zinc well.

In 33% one week – sol. very slight color.

322 Hard but not strong. Very brittle. Very shiny appearance. Does not stick to zinc well.

In 33% one week – sol. colorless.

323. Very strong + hard. Dull appearance. Does not stick to zinc well. Difficult to fuse.

In 33% one week – sol. dark brown-yellow

About same as Crude Trinidad.

3/2/06.

Substances
Paraffine
Hard Cuban Asphalt

324. 10 o/o Paraffine
90 o/o Asphalt

325. 20 o/o Paraffine
80 o/o Asphalt

326. 30 o/o Paraffine
70 o/o Asphalt

About same as Hard Mexican.

3/2/00

Substances
Paraffine
Prime Cuban Asphalt

327 10 o/o Paraffine
90 o/o Asphalt

328 20 o/o Paraffine
80 o/o Asphalt

329 30 o/o Paraffine
70 o/o Asphalt

330 Good – very strong and hard. Sticks to spruce pretty well.
In 33 o/o one week – very slight color

331 Good – strong; slightly pliable. Sticks pretty well.
In 33 o/o one week – very slight color.

332 Not so good.

3/2/06.

Substances
Paraffine
Crude Trinidad Asphalt

330 10 o/o Paraffine
90 o/o Asphalt

331 20 o/o Paraffine
80 o/o Asphalt

332 30 o/o Paraffine
70 o/o Asphalt

333 Somewhat pliable but not very strong.

334 N.G. - Melting point too high

335 Not very strong; brittle

336 Very brittle and not strong

337 N.G. - Forms bubbles and blows mixture up to a froth

338 Brittle; not strong

339 Brittle; not very strong

3/5/06.

Mix small amounts of the following substances with "Hard Mexican" or "Prime Cuban" Asphalt and note the effect upon properties of the mixture.

333 Coal Tar

334 Coal Tar Pitch (?)

335 Wood Tar Pitch

336 Rosin

337 Sulphur

338 Naphthaline

339 Cylinder Oil

340. Good; not so brittle; somewhat porous but quite strong. Sticks to fn O.K.	340 Caoutchouc
341 No improvement unless much is used (say 50 o/o). This makes it strong but still brittle.	341. Gelutong
342 Quite strong, very hard, brittle	342 Magnesia
343 Fairly strong; better than asphalt alone	343. Infusorial Earth
344 Fairly strong	344 Sand
345 N.G. – Mixture very hard to fuse and very brittle.	345 Water Glass

3/8/06.

Melt up the following mixtures, cast into cakes and note properties of these after cooling. Try different proportions.

346 Good. 10 o/o Paraffine enough. Strong, hard, slightly pliable, sticks to fn well. Melts easily.	346 Crude Trinidad Asphalt, and Paraffine.
347 Hard, still brittle, quite strong. Small quantities of Caoutchouc cause very little improvement.	347 Crude Trinidad Asphalt and Caoutchouc.
348 Hard, still brittle, fairly strong. About like 347.	348 Crude Trinidad Asphalt and Gelutong.
349 Soft, very pliable, tough.	349 Crude Trinidad Asphalt, Paraffine and Gelutong
350 Rather soft, pliable, fairly strong	350 Crude Trinidad Asphalt, Paraffine and Caoutchouc.
351 Very good. Little stronger even than 346, hard, slightly pliable, sticks to fn well. This applies to a mixture as follows:— Asphalt 70 o/o, Sand 20 o/o, Paraffine 10 o/o.	351 Crude Trinidad Asphalt, Paraffine and Sand (fine).

1

352 Makes up O.K. Quite strong after baking.

353 Better than 352. Oxide seems to be fused to strip. Presents vitrified surface when broken away – probably fused Cu_2O.

354 Makes up good but crumbles and cracks during baking. Does on top of heap better than others.

355 Not quite as strong as 352 after baking. Impracticable to handle as it is very weak until baked.

3/14/06.

Oxides for Dry Cell.

Try making oxides up with a copper strip in the middle to strengthen and support them as well as to use for the electrical connection.

352 Moisten oxide with 33 o/o KOH. Give 300 at press (= 5.72 tons per in²) Dry with gentle heat and then bake.

353 Moisten with 21 o/o KOH.

354 Moisten with 25 o/o NaOH.

355 Moisten with H_2O.

356 Results.

Made a small measure of 64 cc. capacity. When this is filled level full of moistened oxide it makes a cake $\frac{7}{4}$" wide which is about right for 50 amp-hrs. (weight approximately 100 g.)

In mixing, 10 cc. of KOH solution to each one of these measures of dry oxide is just right.

Best pressure to use seems to be 225 at. = 4.29 tons per in.^{2} of oxide. Heavier pressure works good also but is unnecessary.

The drying is done over a steam radiator. If left there over night they are dried sufficiently.

In baking, the temperature must be brought up very slowly. Have been putting cakes in at 8.00 A.M. and burning gas low without air until 1.00 P.M. Then start blower and slowly increase heat until at about 3.30 P.M. oxides are up to a bright red heat. Keep

3/19/06.

356 Make lot of oxides using 21 o/o KOH to moisten and determine right amount of moisture also best pressure to use and details of the drying + baking.

---

firing at this temperature for about 2 hours, then turn gas out and let cool slowly.

When cold the oxides are boiled out with water and the surface is reduced by zinc dust moistened with KOH. They are then boiled out again and dried.

357 Works fairly well but deposit of Hg is too black.

358 Works pretty good but deposit of Hg is not always clean. Can be brightened up by washing with dil. HNO_3.

359 HCl throws down white ppt., probably calomel, from Hg Nitrate, which will not dissolve unless much more HCl is added. When this is done solution does not work well. Hg is precipitated but has brown coating.

3/20/06.

To Amalgamate the Zinc.

357 Clean with dil. H_2SO_4, then pour in metallic mercury and shake it around until it adheres.

358 Method given by Cathcart in his "Primary Batteries" as follows, — Dissolve 1 part Hg by weight in 3 parts aqua regia, then add 3 parts more HCl. Immerse zinc in this solution.

359 Method given by Park Benjamin in his "The Voltaic Cell" as follows, — To concentrated solution of Mercuric Nitrate add its volume of HCl. Immerse zinc in this solution.

360 Results.

If zinc is fairly clean a mixture of 1 vol. Nitrate solution, 2 vols. HNO_3, and 9 vols. H_2O gives a bright, uniform deposit of Hg.

If zinc is not so clean, 1 vol. Nitrate solution to 3 of HNO_3 and 8 of H_2O should be used.

After amalgamating, the cans should be rinsed and then filled with strong KOH and allowed to stand for an hour or so. This will clean and brighten the mercury deposit and will also allow the local action, which there is likely to be at first, to take place before the cell is sealed up.

360 Make conc. solution of Hg Nitrates by dissolving Hg in HNO_3. Then to 1 part of this solution add "x" parts of HNO_3 to clean deposit and "y" parts of H_2O to retard action.

Should think a mixture of this kind with the proportions determined right would work O.K.

Results.

361 KOH bubbled up through sealer and when it cooled off passages remained, down to liquid. Sealer was poured too hot and air gaps between electrolyte and cover was not large enough.

Short-circuited cell over night and can was eaten right through, mostly at the top.

3/22/06.

Dry Cells.

361 Zinc can, soldered; not amalgamated but cleaned with H_2SO_4.

Oxide looks poor – coated with 21 o/o KOH.

Electrolyte, 33 o/o KOH, about 310 cc.

Cover, cardboard, not doped.

Sealer #346, 10 o/o Paraffine.

Results.

367 Seals between sealer and can.

Short-circuited over night and can was eaten right through in a circle on plane with top of oxide. This shows a defect of this kind of oxides which must be remedied. Exposing the copper strip at base of oxide as well at the top will help some. It may be O.K. however if surface is reduced good. This oxide was not.

Dry Cells, cont'd.

367 Thin can amalgamated by #357.

Oxide made with 21%.

Electrolyte, 33% KOH put in hot.

Cover, cardboard dopped with reg. sealer #346.

Sealer, regular #346, poured in three instalments so as not to heat up cell so much.

Results.

363 looks O.K. but when held upside down, small pinholes show up between sealer and can. Sealer tends to shrink away from can on cooling which probably causes these.

S.C. over night and can was eaten through in a clearly defined circle; cutting the top part loose.

Dry Cells, cont'd.

363 Zinc can, amalgamated by #358.

Oxide poor, 21%.

Electrolyte, 33% KOH put in cold, 305 cc.

Cover, cardboard doped with reg. sealer.

Sealer, reg. #346 poured all at once and quite hot.

Air-gap about ¼".

Results

364 Very small pinholes between sealer and can, show up on inverting cell.

On standing several days the KOH crept and the pinholes grew larger until cell leaked almost all the way around at the top. Small leaks made their appearance through the solder of the seams also.

Dry Cells, cont'd.

364 Tin can, amalgamated by #358.

Oxide poor, 21%.

Electrolyte, 33% KOH put in warm.

Cover, cardboard dipped with reg. sealer.

Sealer, reg. #346 poured quite hot and all at once.

Air gap large about ⅜" or more.

Results.

365 Sealer only between sealer and can at seam.

Stood 2 days and then discharged at 1 amp.

Ran 49.5 amp.-hrs to .30 V. with average P.D. of .55 V.

Opened cell after discharge and found electrolyte milky and bluish. The can which originally was .040" thick was now .018" at the top and .026" at the bottom. The oxide was all reduced except a very little at the bottom. The can that was left was somewhat brittle and could be broken easily, indicating that rather too much mercury was used.

3/27/06.

Dry Cells, cont'd.

365 Thick can, anod. #360.
Oxide poor
Electrolyte, 330 g KOH, 315 cc.
Cover, cardboard dipped neg. Concrete dry
Sealer #346 poured all at once and very hot.
Air-gap about $\frac{1}{4}$".

Results.

366. Seals very slightly between sealer and can at seam.

Sealer was poured too hot and shrunk great deal. Not enough rubber to fill in cracks well.

S hot-incurred cell and in the first hour it heated up so that plug of sealer was loosened and forced up a little. After leaving S.C. on for 24 hrs., opened cell to examine.

KOH looked milky + seemed to be effervescing. Zinc was coated with a bluish gray scale. Zinc seemed to be eaten away fairly uniformly and not very deep. Oxide was reduced right in to strip at top but only about $\frac{1}{16}$" in at bottom.

Dry Cells, cont'd.

366 Thick can, annal. #360.
Oxide poor
Electrolyte, 33 % KOH, 313 cc.
Cover, cardboard dropped reg.
concave side up reg.
Sealer, about $\frac{1}{16}$" melted rubber and then #346 poured all at once and very hot.

Results.

367 O.K. - does not leak!
Stood over night and slight leak appeared between sealer and can at seam.
After standing 1 day, discharged at 1 ampere.
Ran 48.49 amp-hrs to .30V. with average P.D. of .55 V.

Dry Cells, cont'd.

367 Thick can, anial #360.
Oxide poor
Electrolyte 33% KOH, 310 cc.
Cover, cardboard doped neg.
Sealer #346. Poured all at once after first cleaning can with emery cloth and benzole. Also smeared seam with sealer down for about 2" inside.

Results.

368 After standing all night only leaks through pin-hole in solder. Does not leak where KOH bubbled up through sealer.

After standing 1 day, discharged at 1 ampere.

Ran 43.7 amp-hrs to 30 V. with average P.D. of .56 V.

Dry Cells cont'd.

368 I lick can anneal. #360. Solder in top of seam inside and can cleaned inside at top with emery cloth + benzole.

Oxide O.K. – reduced good.

Electrolyte, 33% KOH, 310 cc.

Cover, cardboard dipped neg.

Sealer. #346 in 2 instalments, 2nd one was poured very hot and KOH bubbled up through the center of it.

Air-gap small.

Rubber spacing washer.

Results.

369. No leak at first, stood over night then leaked in several places.

After standing one day, discharged at 1 ampere.

Ran 52.95 amp-hrs to 30V. with average P.D. of .55 V.

After discharge, can was still strong and not little like #365. It was eaten away very uniformly there being .020" left unattacked at the top and .025" at the bottom. Oxide was all reduced except a little, next to the strip at the bottom and extending up to the middle. Electrolyte was milky as usual.

200 cc of 33 o/o KOH ordinarily gives 24 amp-hrs. or less, therefore 315 cc should give 37.8 amp-hrs. at the most. But 315 cc here in the dry cell runs 52 amp-hrs. or 37 o/o better than under ordinary conditions. This result must be effected by the conditions in the dry cell which

Dry Cells, cont'd.

369. Thicks can, annual #360. Solder in top of seam and can cleaned at top with emery then benzole.

Oxide good. Strip exposed at bottom as well as top by bending it over in a goose-neck at the bottom and sealing only the lower half to the bend in asphalt. 5

Electrolyte 33 o/o KOH, 315 cc.

Cover, cardboard doped reg.

Sealer #346 poured very hot in 2 installments, then when cool more on top to fill up cavity.

Rubber spacing washer.

---

are very nearly ideal. The zinc has a very large surface for the electrolyte to act upon and the total amount of electrolyte is located between the two electrodes.

Results.

370 Does not leak.

Stood over night and then small leaks showed up between can + sealer on inverting.

After standing one day discharged at 1 ampere.

Ran 43.15 amp-hrs to 30V. with average P.D. of .55 V.

Solution just come through can near the bottom after running 43 amp-hrs. At the end of discharge it had come through the top also all the way around and can was thin as paper in the middle. Did not come through the bottom spot enough for much to leak out. Oxide was reduced in to strip at top and nearly in at middle and bottom.

Dry Cells, cont'd.

370 Thin can, annal #360 Solder in top of seam + can cleaned at top with emery cloth and benzole.

Oxide good. Strip exposed at bottom like #369.

Electrolyte, 33 % KOH, 300 cc.

Cover, cardboard doped neg.

Sealer #346. Some poured first as deep as possible without closing up slit in center along side the strip, then when expanded air has escaped, finish pouring. This method should prevent bubbling.

Air-gap large.

Copper spacing washer.

Results.

371. Does not leak.
After standing 4 hours, discharged at 1 ampere. Did not start to leak until it had been discharging 18 hours.
Ran 54.8 amp-hrs to .30 V. with average P.D. of .54 V.
Zinc was eaten away very uniformly, there being .018" left at the top .022" at the bottom and .023" in the middle. O side was completely reduced.

3/29/06.

Dry Cells, cont'd.

371. Tinck can, annal. #360 Solder in top of seam and can cleaned inside at top with emery cloth.
O side good. Strip exposed at bottom like #369. One corner clipped off in bending strip.
Electrolyte, 33% KOH, 315 cc
Does not quite come to top of oxide.
Cover cardboard doped reg.
Sealer #346 in 2 installments like #370. Top of can heated with Bunsen burner before and after pouring.
Air-gap about 3/16"
Rubber spacing washer.

Notes.

*247 - This cell stood several days after discharge with the rest and solution became pink. This gradually settled and formed in five distinct layers graduated from the regular straw color at the top, through pink to a pinkish purple at the bottom. The bulk of the solution was straw colored - the four bottom layers occupying about 1½ inch.

*256-264. Silicate dissolved in strong KOH makes clear solution In weaker KOH, solution is turbid.

Notebook, N-04-11-18

XE-172 W A Warren N-04-11-18
1904

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1 to 8 Microscopic work on changing NH_4OH Nov 18 to 29

8 + 9 " Feb 28 to

10 Analysis of Solution of test cells 2/16

11 + 14 Constant resistance of Ni + Co plates in KOH

12 alloys of Co + Ni in electrolyte March 6 to 23

15 Plate alloys of Co + Ni Electro plated

20 to 25 Chg on internal resistance of test cells with different concentrations of KOH Also 3 OH per 2 of Resistance of under-packed Ni

27 to 29 Resistance of plate Ni graph Co etc 2/5 to 3/4

94 to 97 Efficiency test of test cells at different charge rates Nov 30 to Feb 3 04

Continued in second book

2 iron
1 nickel
.700 charge for 5 hours
.700 discharge

Now

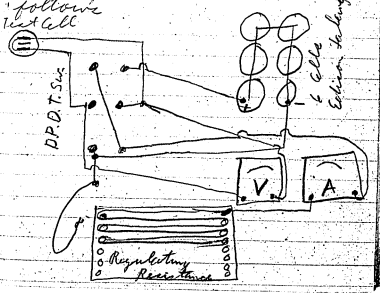
Get a good cell to charge at 500 ma
Watch effect voltage of during chg & dischg
after charge battery [illegible]
Then chg at following temps

32
40
Normal
80
100
120
150

Efficiency of Edison Storage battery at different temperatures

Obtained test cell #4358 from testing room
cell consisted of 2 iron and one Nickel in small glass jar said to contain 21 % KOH.

Nov 30 Connected up charging board as follows



12/1/04

Charged cell at 100 MA for 5 hours and discharged at same rate both at normal temperature

see sheet #1+2

input 30 amp min
" 49.6 watt min
output 26 amp min ?
30 watt min ?
eff 75% ?

charge curve marked
discharge " "

12/2/04

Put cell in vessel filled with ice and let it remain until temp became constant at about 1°C started current at 200 MA. only 0.2 Volt drop - curve cell evidently short circuit took cell apart could not find anything set it up again and let temp get down to 1°C and started charge at 200 MA volts at start 1.6 O.K. Charge started at 11.30 AM

□" in Charging curve = 273 marked
X 6 2/3 = 1.822 watt hours
□ in Discharge curve = 195 marked
X 3 1/3 = 650 watt hours

$\frac{650}{1.822}$ = 35.6% eff

tin AO 9

12/5/04

On charge at 7.00 ma
at 7.0° C at 10.00 AM
Off at 3 P.M.
Temp. Constant at 2.0° C.
□" in charging curve = 2553.7 □"
with watt hours =
2553.7 × 2⅔ 1705 watt hrs
charge curve marked ^
Discharge " °
Discharged started at 4 P.M
by testing room
I" in Discharge curve 202.14
with watt hours discharge
" = 202.14 × 3⅓ = 674.
= 39.5% eff.

Put in 400 mil amp hours
at 100 rate,
discharg two R —

12/6/04.

Cell # 4358 had been put on charge at midnight by mistake
Got cells nos 4269, 4270, 4271, 4272, 4273
to charge at 100 rate for 4 hours at different temp. and discharge at 100 rate at normal temperature
Cells were on charge for 11 hrs at 200 discharged then to .75 volt.

No 4270 was short circuited
charged it at 100 rate for one hour + discharge to .75 V
All cells reached .75 volt in about 1 hour

Added 6 more Edison Lalande cells to charging battery and arranged mercury cups so as to be able to run 5 cells in series

Changed 1st time @ 200 Discharge

	Run 2		Run 5		Run 8	
	3.0	1.0	3.0	1.0	3.0	1.0
4269	3.72	4.57	5.98	4.87	6.18	5.04
70	3.75	4.63	S.C.	S.C.	S.C.	S.C.
71	3.75	4.50	5.99	4.85	6.17	5.02
72	3.72	4.50	5.98	4.77	6.17	4.99
73	3.75	4.63	5.97	4.75	5.99	4.71

12/9

Cell # 4269 charged at 100 R
at 30° C on at 12 noon

□" in curve = 179
multiplied watt hours 596.7
Ave Volts 149.2
□" in discharge curve 112.85
multiplied watt hrs 376.17
ampere hours 2.51
Ave volts 1 115
Eff. 63%

12/7

Cell # 4270 @ 100 mch
steam increased
□" in charge curve 199.6
= milli watt hours 665-
Av V 1,663
□" in discharge 104.3
milli amp hours 273.3
" watt hours 342.7
watt eff 56.4
Av Volts 126.7
Cell # 4271 same
□" charge curve = 198.8
milli watt hours = 662.7
Av Volts 1,665-
□" in discharge 137.
milli amp hours 360
" watt hours 452.7
watt eff 68.9
Av Volts 1,268
Cell # 4272 same
□ in charge curve = 198.5-
milli watt hours = 661.7
Av Volts = 1,65-.4
□ in dis curve = 136.5-
milli watt hrs = 435-4.8
" amp " = 35-1.7
Av Volts = 1,29.3
Eff = 68.7%

12/4

Cell # 4273 at 1½° C
□" in charge curve = 209.0
milli watt-hours 6 6 6.7
Av Volts 1.7 4.2
□" in Discharge = 131.1
Hill amp hrs = 341.
" watt " = 43.7
Av volts = 1.281
12/8 Eff = 62.7%
Put cells on discharge at
100 Ruts at 22° C

12/9

Charging Cells at 100 watts for 4 hours

4241 @ 65°C

□" in Chg	= 172.5
Mill watt hrs	= 575.14
Av Volts	= 2.438
□" Discharge	= 97.9
Amp hrs	= 217.
watt hrs	= 321.3
Av V.	= 1.221 W.eff = 56.7

W.eff 4 2 @ 1½°C

□" in Chg	= 208.35
Mill watt hrs	= 694.25
Av V	= 1.336
□" in Disch.	= 1.35.1
Mill Amp hrs	= 335
" watt "	= 450
Av V	= 1.344
W.eff	= 6.48

12/9

4270 @ 22° C

□" in chg curve = 201.25
Milli watt hrs = 670.85
Av volts = 1.677
□" in dis = 116.35
Milli amp hrs = 311.
" watt " = 389.17
Av volts = 1.251
w Eff = 57.3%

4269 @ 22° C

□" in charge curve = 197.5
Milli watt hours = 657.30
" amp " = 400.
Av Volts = 1.641

Disc

Milli watt hrs = 408.5
" amp " = 321.7
Av = 1.27
Eff = 62.0%

	0	2	4	6	10	20	40	60	80	100	120	140	161	186
271	140	.41	.42	42+	42	42.5-	43.	43.5-	43.	43.5-	44.	44.5	45.	45.4
72	57.5-	65.5-	69.5	69.5-	70	70.5-	72+	74	75+	75.5-	75.5-	75.5	75.5-	74
70	57.5	56.	59	59.5	61	62.5	64.	65-	66.5-	67.5-	68.5-	69+	70	70.5-
69	53.5-	57.5	56	56.5-	58	59.	61	62+	63.5-	64	65.	66	67+	68
73	69	71	74	74.5	75	76.	77.5-	79	81	81.+	81.5-	82.	82.5-	83-
	200	220	240											
271	44.+	.45.5	45.8		~~20° to 120°~~			65°C						
72	73.	72.5-	72		1½°C									
70	71.	71.5-	71.5-		20°									
69	68.5-	69	69		20°C									
73	82.5-	82.5-	83		8° to 120° F									

Readings during change 12/9/04

12/9

4273 @ 110°F = −12°C

□ 4.5 mm Chg current = 2.6.5.5-
Alla watt tra = 72.8
cur □: Reading = 1.804
□: Reading = 1.13.5-
Mult amplifier = 29.5
" watt tra = 37.2.1
Cur Shunt = 1.2.5.7
Watt Volts = 5-1.5.4-%
14.10
Disgrund up change current

Notebook, N-06-07-08

8-7-06

Mr. Thomas A. Edison,
c/o F. W. Myers,
Rouses Point, N. Y.

8-16-06

Mr Thomas A. Edison,
Chateau Frontenac, (Hotel)
Quebec Canada

8-25-06

Mr. Ralph Arbogast,
Northport, Long Island,
N.Y.

Mr. Ralph Arbogast
Box 272 Northport,
Long Island,
N.Y.

Crash after 29th Sep. 1906
about 3 hours

Mr. Ralph Arbogast,
Dodd St.,
East Orange, N.J.

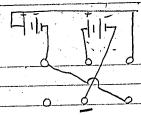
Telephone: 1914 Orange.

Cr. Brighton & Dodd

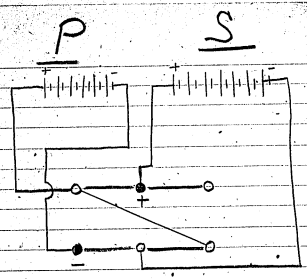
5

{ Percival Holland
{ Walter Holland

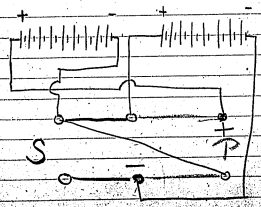
Telephone 1969 J. Orange.

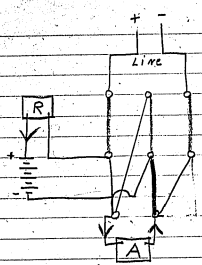


P & S in Room #1



Series and parallel





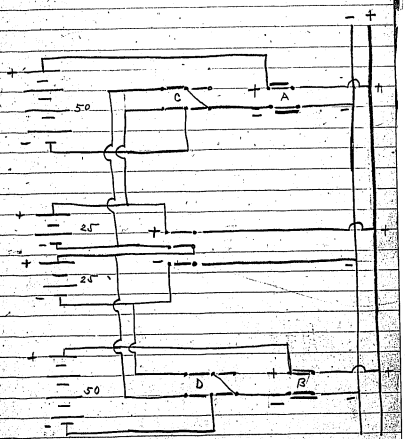
Charge

Discharge

Charge & Discharge

for Table-

Three lots of 50 in parallel = 3x50
Two lots of 75 in parallel = 2x75



A + B can be one switch
C + D " " " "

~~On and after SEP 22 1906 New M. tubes run 8 times at first and four times after 50 Hot Runs.~~

~~On and after OCT 28 1906 M. Tubes on hot Test are run as follows:-~~
~~A. Cells which run over 900 on the board (taking the group) are to be charged 4 hrs @ 300 m.a. and run @ 200 m.a.~~
~~This is called Class A.~~
~~B. Cells under 900~~
~~Charge 4 hrs @ 300 m.a.~~
~~Run @ 150 m.a.~~

~~On and after Dec. 18th 1906 all new M. tubes to be run on the hot test as follows:-~~
~~Charge 8 hrs. @~~
~~discharge (this) @~~

~~On and after Dec. 20th 1906 T.A.E. Drums are to be run as follows:-~~

Run	charge @	Run @
1	15 400 m.a.	300 m.a.
2	15 400	300
3	15 400	300
4	15 400	150
5	15 400	150
6	15 400	300
7	15 400	300
8	15 400	300

~~On and after Dec. 18th 1906 all new tubes run 50 times on hot test as follows - charge 8 hrs @ 200 m.a.~~
~~Run (this) @ 180 m.a.~~
~~until further notice — i.e. Jan. 29, 07.~~

~~On and after Jan. 29th 1907 all the cells on hot test run as follows:-~~
~~charge 6½ hrs @ 200 m.a.~~
~~Run (½) @ 180 m.a.~~

Silver Solve Ni.

Run 9 times. 8-28-06

Run	hrs ch	@	Run @
1	15	200	100
2	15	200	100
3	15	200	100
4	15	200	100
5	15	200	100
6	15	200	100
7	4	130	100
8	4	130	100
9	4	130	100

Take off at 1 Volt.

Caliper after 1st and 9th Runs.

One Ni pocket assembled with two charged Fes.

Silver Solve Fe.

Run 8 times. 8-28-06

Run	hrs ch	@	Run @
1	15	400	300
2	15	400	300
3	15	400	300
4	15	400	300
5	15	400	300
6	15	400	300
7	15	400	300
8	15	400	300

Caliper after 1st and 8th Runs.

One Fe pocket assembled with four charged Ni's.

Sel

T.A.E. Hi Tubes -

Regulars 8-28-06

Charge @ 300 m.a.
Run @ 150 m.a.

Run 6 times on board then put on shut test for fifty hours -

After hot runs change RO H (or Special Bulbs) and run on board five times -

Old tubes run four times on the board -

On and after Dec. 20th 06 all Hi tubes run four times on the board -

Charge 15 hr @ 300 Run @ 150

Then fifty hot Runs -

New tubes run five times the first series on the board.

T.A.E. Tes. run as follows on and after Feb. 19 - 1907

Run	hr ch @		Run @
1	15	400	300
2			250
3			250
4			300
5			300

Any over 100 to the Volt go to Volby for Efficiency Run etc. Others are condemned.

[23]

Curve Shut Marks.

First Curve on Shut	•
Sunday	^
Monday	°
Tuesday	✓
Wednesday	+
Thursday	)
Friday	△
Saturday	×

Note

This mark —☆— in the Hot Snowance book means the following treatment where ever it appears—

10 hrs ch. @ 300 m. a.
10 " Rest
10 " ch. @ 300 M. a.
10 " Rest.
10 " ch. @ 300 m. a.
Run @ 150 m. a. (Regular after this until further notice)
Sep. 17th 1906.

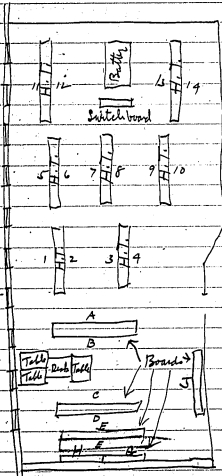
Regular T.A.E. Trains run as follows.

Run	Leave	@	Run	@
1	15	400	300	
2	15	400	300	
3	15	400	300	
4	15	400	500	
5	15	400	500	
6	15	400	300	
7	15	400	300	
8	15	400	300	

on and after Oct 9th 1906 until further notice.

Room #2

DEC 20 1906



Notebook, N-10-05-29

Vehicle Road Tests.

Old "Waverly" Runabout
Battery - 45 A4 cells (new in May, 1910.)
Weight of machine and battery (no passengers) - 1580 lbs.

Old "Waverly" - 7 seat #1.

West Orange to New Brunswick

via Shore Route

May 29th 1910.

Time	Mileage	Amperes	Volts	Grade	Con. of Road	Remarks
8.40 A.M.	3829.–		open 67	Level	Good - MacAdam	West Orange - Laboratory
8.45		35	66	"	" "	" "
9.00		45	57	2% up grade	" "	South "
9.15		41	55	" "	Fair	Milburn - oiled
9.25		50	53.5	10% "	Poor	Union "
9.35		32	56	Level	Fair	So. Elizabeth "
9.45		none	open 62	"	"	Elizabeth (motor head come loose) (Thursday delay)
9.50		35	55	"	Good	" Park
10.–		38	53	1% up grade	"	Rinden
10.15		33	54	Level	"	Rahway
10.30		25	55	5% down grade	"	Jralin
10.35		36	54	Level	Bad	Menlo Park
10.45		37	53	"	Fair	Metuchen
11.–		34	53	"	Good	Highland Park
11.15	3860.–	none	open 61	"	Bad (cobble)	New Brunswick

(Stopped at the Mansion House & had dinner - left at 12.15 - see over)

Average mileage going trip 31

" miles per hr. 13/5 miles

New Brunswick to West Orange via Shore Route May 29. 1910

Time	Mileage	Amperes	Volts	Grade	Con. of Road	Remarks
P.M. 12.15	3860.–	none	open 61	Level	Badly Bad Stony	New Brunswick
12.16		62	53	abt. 20% up grade	" "	" "
12.20		42	53	Slight up "	Good	Highland Park
12.30		35	53	Level	"	Metuchen
12.50		33	53	"	"	Menlo Park
1.–		35	53	"	"	Iselin
1.15	3873.	36	52.5	"	"	Rahway {13 miles per hour}
1.30		38	52.	Slight up grade	"	Rundu "
1.45		33	52.	Level	"	Elizabeth
2.–		34	51.5	"	Poor	Union. city.
2.15	3884.	37.	51.	"	"	Springfield - city
2.30		34	50.5	"	Good	Maplewood
2.45		54	46	10% up grade	"	South Orange
3.00	3893.	32	48	Level	"	West Orange (Laboratory)
3.10		30	42	"	"	" " Vicinity of Laboratory
3.15		35	30	"	"	" " Here's where the
3.20		32	20	"	"	" " voltage dropped very
3.24	3896.3	45	12 (opens 88)	"	"	" " quickly
						" " Died on 12 volts.

Total number of miles – 67.3 miles

Average no. miles per hr. app. 12 ½ " (6½ miles)

Accidents – none

Correct
Samuelson

Measles wt 143 -
Elsewhere 150 -

30 miles oiled road, level,
1 mile Loose stone -

45 A 4 Cells
Weight of Machine 1580 lbs.

Old "Waverly" - Test #2.

June 5, 1910.

Time	Mileage	Amperes	Volts	Grade	Con. of Rd	Remarks.
A.M. 9.50	3920.		open 65			Thoroughfare
9.52		32	56	Level	Fair	Valley Roads - W.O. oiled
10.-		30	55	"	Good	Orange
10.15		30	54	"	Fair	Irvington
10.30		36	54	"	Good	Newark
10.45		45	52	2% Grade	Poor	Elizabeth (Dumpy) Pleasant Ave
10.55		34	53	Level	Good	So. "
11.05		31	53	"	"	Linden
11.15		31	52.5	"	"	Rahway
11.25		50	52.	5% Grade	"	Colonia
11.40		38	52	slight "	"	Iselin
11.50		43	51	2% "	"	Menlo Park
12.- P.M.		30	52	Level	"	Metuchen
12.15		38	51	slight grade	"	Highland Park
.20	3950.		open 58.5	Level	"	New Brunswick (Adelaide Av.)

Time	Mileage	Amperes	Volts	Grade	Con. of Road	Remarks.
P.M. 12.30	3950.		open 58.5	Level	Good	New Brunswick
12.35		37	51	slight grade	"	" "
12.45		30	51.5	Level	"	Highland Park
1.-		31	51.	"	"	Metuchen
1.15		33	51.	"	"	Jackson
1.30		34	50.	"	"	Rahway
1.45		38	48.	1% Grade	"	Linden (Ram)
2.-		32	50	Level	"	Elizabeth "
2.15		41	47.5	2% Grade	Fair	Union " Niles
2.30		30	48	Level	"	Springfield "
2.40		38	46	"	"	Millburn " "
2.45		35	46	"	Poor	Maplewood "
2.50		34	43	"	"	South Orange "
3.-		35	34	"	"	" " (Valley St. near So. Orange Ave.)
3.05		38	24	"	"	" " (Vose Ave)
3.07	3980.-	45	15 (open 38)	"	"	" " (Mountain Station)

Total No. of Miles 60.

Accidents- none

Delay - 10 minutes - New Brunswick

Died at 15 volts.

Roads very heavy

Data on Test #2 of
Old "Waverly".

Wt. of car + 2 persons	1880 lbs. (.94 tons)
Total Mileage	60
Running Time	5.1 hrs.
Av. speed	11.76 m.p.h.
Av. current (approx.)	33 amps
A-H output	168.3
Av. voltage (approx.)	52
W-H output	8751.6
W-H per car-mile	145.8
" " ton-mile	155.1

Route No 2. Run 3. Old Waverly from W. Orange to Staten Island, N.J. Tottenville, New Brunswick, Bound Brook, Plainfield

Time		Mileage	Amperes	Volts	Grade	Cor. of Road	Notes
9.25	a.m	4055		open 65.5			Laboratory
9.30			25	59	Level	Good - Mac	Valley Rd. West Orange
9.45			24	58.5	"	" "	Harrison St. East "
10.			25	58	"	" Asphalt	Clinton Ave - Newark
10.15			23	58	"	" Mac	Irvington Springfield Ave. - Waverly
10.30			24	57	"	" Asphalt	Broad St. Elizabeth
10.45			23	57	"	" Mac.	Marshall St. Elizabethport.
10.55		4070	arrived Arthur Kill	open 62	Delay 25 min.		
11.20			Left ferry for Staten Is.				
11.21			23	56	Level	Poor - Plank	Staten Island - Road from Ferry
11.30			23	55.5	"	" - Cobble	Port Richmond. Staten Is.
11.35		4073	arrive at Pt. Richmond Ferry	open 61.5	for Bergen Point		
11.55			" " Bergen Point		delay ferry	20 min hot summer at Bergen Point	1.20 delay 1 hr 20 min
12.55	P.M		24	56	Level	Poor - Sand	Ave C. Bergen Point
1.			28	55	Slight grade	Good - Mac. with ferry	Hudson Co. Road. Bayonne
1.15			20	56	" down "	" " "	Greenville
1.30			25	55	Level	" "	" " Jersey City
1.45			23	55	"	" asphalt	Mercer St. Jersey City
1.50		4083	arrived at P.R.R. ferry at Jersey City	open 61.	Jersey City ferry		Delay 20 minutes
2.10			Left ferry for New York				
2.15			23	55	Level	Good - Mac.	Broadway - New York
2.20		4084	Arrived at Municipal ferry for St. George				
2.45			Left Ferry for Ft. Wadsworth	open 61.5			Delay on Ferryage 25 minutes

Time	Mileage	Amperes	Volts	Grade	Con. of Road	Notes
2.47 P.M	4084	55	52	10% Grade	Cobble	Staten Island
3.		34	53	2% "	Good - B.Pulaski	" "
3.15		40	52	Level	loose stone	Greenville S. I.
3.30		21	54	" "	good - mac	Dongan Hills "
3.45		40	52	3% Grade	" "	Amboy Road "
4.		28	53	Slight "	" "	see " " "
4.15		23	53	level	" "	note " " " Pleasant Plains
4.30		34	52	1% Grade	" "	" " " Tottenville
4.35	4101	—	open 59.5	arrived at ferry for Perth Amboy		just in time to miss it
5.05	4101	last ferry at Perth Amboy	72	delay 30 minutes		
5.05			47	2% Grade	Good - B.Macadam	Hill very steep - Perth Amboy
5.15			53	Level	" mac	New Brunswick Ave. " "
5.30			53	"	" "	Homestead
5.45			53	"	" "	Metuchen
6.			52.5	"	" "	Highland Park
6.15	4133		52.5	"	" "	New Brunswick
6.30			50	5% Grade	Poor sand	between N.B. & B.B. (4 miles southward rutted)
6.45			51.5	Slight grade	good mac	near Bound Brook
7.			52	Level	" "	Bound Brook
7.15			51.5	"	" "	between B.B. + Hunnelem
7.30			51	Slight grade	" "	Hunnelem
7.45			51.5	Level	" "	near Plainfield
8.			51	"	" "	Crown Park
8.15			51	"	" "	Between " & Oak tree
8.25	4130		34	"	" "	" " " " "

(7 miles per hour for 12 miles)

(8 miles per hour for 12 miles)

(8 miles per hour for 7 miles)

Time	Mileage	Amperes	Volts	Grade	Con. of Road	Notes
8.30	4130					Went very slow here, voltage
8.40	4131		open 55	died at 15 V.	good mac	very low and amperes in the
						twenties. Place called Brower
8.40 p.m. phoned to Martin's garage to be towed.						
9.00 P.M. towed into Garage at Plainfield - electrician						
10.	gave machine three hours charge at 25 to			looked over motor to see that same was O.K.		
1.15	4133			30. amperes - left Plainfield at		
arrived 3.15	4151					
				time from Plainfield to Orange - 2 hrs. distance 18 miles.		
				Road from St. George to Jotten ville practically all		
				Bibby country.		
time on road one charge		8 hrs. 15 min.				
actual mileage		76.				
average miles per hr. abt.		9r miles		Road from New Brunswick to 2 miles from Bound Brook		
		hr min.		soft sand for about 4 miles. Dirt just		
Ran out near Oak Park at		8.40 P.M.		covered the tires on machine.		
Left Orange at		9.25 a.m				
		11.15		After passing Bound Brook roads were very fine.		
Delays - 5 Ferries 2 - Dinner 1r		3.00				
		8.15		Amboy Road triple heavy - must have been tarred a short		
				time ago - Sun heated it up.		

Notebook, N-10-12-10

Run Schedule Short tubes

Normal Run Rates (Room temp.)
Charge 15 Hours @ 300 M.A
Dischg @ 200 M.A
Hot test Rates
Charge & Dischg. @ 225 M.A except Rly
Run which Dischgs @ 200 M.A. to 1.V.

3 Normal	New
10 Hot	Short Tubes
3 Normal	Silverlake
10 Hot	Tubes
3 Normal	Hot Test
50 Hot	tubes
3 Normal	
50 Hot	
3 Normal	

1st 3 Normal Runs discharge to .9V.
After 50, 100, 150 & 200 Hot Runs discharge
1st & 2nd Runs to .9V & 3rd Run to .95V
After 250 Hot Runs discharge - 1st - 2nd - 3rd -
and 4th to .9V & .5V
After 300 Hot Runs discharge 1st - 2nd - 3rd -
4th to 1V. .9V & .5V

Detailed Schedule

NEW SHORT TUBES	3 Normal	to .9V
10.–	10 Hot	
SILVER LAKE TUBES	3 Normal	1/2 and to .9V ~~[illegible]~~ 3rd .9V & .5V
50.–	40 Hot	
HOT TEST TUBES	3 Normal	1/2 to .9V & 3rd to .9V & .5V
100.–	50 Hot	
	3 Normal	do
150.–	50 Hot	
	3 Normal	do
200.–	50 Hot	
	3 Normal	do
250.–	50 Hot	
	4 Normal	4 Runs .9V & .5V on each
300.–	50 Hot	
	4 Normal	4 Runs 1.1V .9V & .5V on each

~~repeating the 4 Normal to 1.1V .9V & .5V~~
after every 50 additional Hot Runs

Tubes changed after every 50 hot runs, received with 21% KOH + 11.2 grams Li OH per liter of 21% KOH + 0.2 gram Li OH per 175 CC.

Tubes to be inspected & physical condition recorded after every cycle of hot runs & amount of sediment weighed or calcined.

Reports and Records

All normal run results and Hot capacity are entered daily & when that particular series is finished, results of tests are put in record books, also T A E's remarks (C. Ox etc)

Long Tubes (Report. TAE 1/4")

Regular Factory Daily Production.

Set up in long cans & run regularly in 21% + 11.2.

Never run hot unless special, when they may be put up under short tube No. & run same schedule as shorts excepting as to rates.

Normal Rate
Charge 15 hours @ 400
Discharge @ 250 M-a ~~#~~ to .9V then ~~C.V~~ after 3rd Run
Hot Test Rates Chg Dis @ 300 M-a
Dis. to .9V. Rest Run the same

Regular & Experimental short tube records are also entered on Record cards, and sent to Edison Chemical Works, after each cycle the physical condition of each tube being also noted & entered on record card after every 50 hot hot runs.

New Short Tubes receive their first Charge on either Monday PM Wednesday PM or Friday PM

December 1914. When a group of Regular Short Tubes is cut out after the 16th run the elements, with solution & sediment for two tubes only, are to be sent to Edison Labs, once a week, for analysis.

Notes on recently continued four pages forward

April 15/15. Five different sets of tubes, instead of one, to be returned each week after 16th Run.

Commencing June 10/14 all F.A.E. Fes were assembled in short cans, pocket #149 E (F.A.E. EXP 232) being the first. On June 26/14 — 16 pockets which were originally put up in ~~short cans~~ long jars were remounted with wed nickle & put up in cans to run on hot test.

F.A.E. (Marked Fes)

Set up in short cans and run regularly in 21% + 11.2%

All small Fes.

Charge 15 hours @ 400 M-a

Run schedule

1st Run,	Normal	Dis.	@ 300 M-a to 1.1V + .5V
2nd & 3rd "	"	"	@ 750 M-a to 1.1V + .5V
4 + 5 "	"	"	@ 300 M-a to 1.1V + .5V

50 Hot Runs @ long tube rates, unless marked for Cold Test (35°F Dis.)

Repeat (with 5 Runs Normal + 50 hot) indefinitely until E.O.

Report to F.A.E. Fes, Hot Fes + long Tubes (Hot)

April 19th 1915. Solution in Cobalt cells to be changed every 48 hours.

Silverlake corrugated [illegible] @
4th [illegible] for [illegible] 5" [illegible]
100 [illegible] for [illegible]

Silverlake Tes.

Loaded @ Silver Lake
Set up in glass jars & run regularly
in 21% + 11.2

Normal Runs only (5 gram pockets)
Charge 15 hours @ 400 M-A

1st 2nd 3rd Dis. @ 300 MA to 1.V

4th 5th 6th Dis @ 750 MA to 1.V & .5V

7th 8th Chg @ 300 MA to 1.V
" " " " to 1.V & .5V

5 gram pockets Charge @ 500 MA
Discharge @ 400 MA
Runs 1-2-3-7 & 8 & 750 M.A Runs
4-5 & 6 to same points as 5 gram

Micrometer caliper taken after 8th Run.

Record & Report Silver Lake Tc Bk
also Daily Report to Silver Lake & record
of average room temp.

May 13th/14 Small Fes that are to be run until notified solution changes after run 48 & every 48th run thereafter. i.e after every 6th cycle

June 10th/14 Commencing this date all Exp. Fes that are to run until notified will be assembled in short cans.

July 24th/14 Mr S. L., NEG. & EXP. Fes of NEG. DI Fes to receive 1st Charge Friday nights as this will bring the 5th run Monday making a stand between the 7th & 8th runs

April 19th/15 Reading run on Hot test to be about 5th from end of each cycle, so that it can be repeated should the result of 1st be abnormal in any way

Sept 23rd 1915 At J. T. Miller's request all Regular Silver Lake 5 & 8 plain test packets will receive 2 cycles of 8 runs each & respective tests instead of the cycle as hereto fore

Cold Test Fes

Regular test for those & one that gives the most information in the shortest time is.

First Cells must be cans, not plain
Second As cells have already run normal & stood idle after prior —
1 Normal Run @ 75° F
Chg 15 hrs @ 400 M A @ 75° F
Dis @ 300 M A to 1.1 & .5 V @ 75° to bring them back to average, then

3 Runs Charge 15 hrs @ 400 M.A @ 75°
Dis. @ 300 M A to 1.1 & .5 V @ 35°
3 Runs Charge 7 hrs @ 400 M A @ 75°
Dis @ 300 M.A. to 1.1 & .5 V 35°
After discharge @ 35° F raise temp of cells to 75° & discharge again to .5 V to get residual

Report G. A. & Fes.

D.P. Fes. (8 grains)

Same rates &c as Silver Lake 8 grain Fes.

If capacity is below 1900 after 8th run reassemble with sized mix & re run & if still low B.C. & duplicate.

March 28th 1913. Effective April 1st all D.P. Fe pockets will be pressed @ 115 atmospheres. This is equivalent to the pressure of 120 tons per 17 plate, used in regular manufacture.

Commencing with pocket 2113 all D.P. Fe pockets will be assembled in same instead of flat as heretofore

Up to May (approx) 1913 all D.P. pockets were shaped with convex die @ 100 atms or 4 tons per pocket, before pressing with corrugating die @ 115 atms or 5 tons per pocket; this was discontinued, as method was not in use in factory.

D.P. B. Fe Test.

7" Cam 435 CC 21 + 11.2
8" " 500 " "

3 Runs Changing 15 hours @ 3.75 a
and dosing to 1V @ 3.75 a

Report to ~~Director Monday~~ R.B. Bachman J.J. Miller Mc Clain Monahan
Mis. Cop. 25 A. H.

Temperature of Act. Test tables
to be kept from ~~130° — 135°~~ F changed 126° to 132° F fig. 11/10 MAE

Cells to be steamed off before Act test, and after to take off carbonate

No sets to start on Thursday as this will bring 3rd Run on Monday

Punch a big hole in metal tags of cells having special solution

3-25-1915

Entering capacities of Nos Tes

Heretofore it has been customary to enter Cold test capacities in Purple ink, & Normal capacities in Blue ink. After drying however they are very similar. So hereafter Green ink will be used instead of Purple

Blue ink	Normal Capacities
Green "	Cold "
Red "	Hot "

When the capacity of Daily Product in 1/4" long tube is below 1700 M.A.H. on the 3rd run and Daily Production Equal Tes below 1900 MAH on ~~third~~ last run they are to be reassembled with new Tes & new Ohs respectively, & new one & showed they then be below capacity after 3rd test more than 1/10 of capacity, they are to be duplicated.

April 14/15 In the event of only one pocket being below capacity to other one is to be run with original unbeds for comparison & should both be low, then a pocket with same wire if one is in lot, & of good capacity is to be run for same purpose.

3/16" tube if below 900 M.A.H on 3rd run, & 1/4" tube below 1700, are to be reassembled with new Tes, & a good capacity tube with same hydrate run with them for comparison

Loading "Short" Tubes. 14" x 3 5/16

Speed #0 to #8 tamps per minute

Weights

Tamping Rod 3½ lbs.

Flake 140 Milligrams per 10 Dumps

Hydrate 235 to 245 milligrams per 10 Dumps

Dumps 250 to 275 per tube

Weight per tube 7,100 gr to 7,800 grams

Cleaning

Correcting tubes

Filling to proper length

Cap & top put in before removing from machine

Loading 4 tubes instead of 2 when weights exceed 7,800 grams. 4/4/14 2 tubes may to be charged from hopper and further tubes are to be charged one of 200 milligrams after one of the tubes with the exception

Before starting to load a tube the dasher in Flake hopper must be set in an upright position.

Before loading the hydrate is ground & then passed thru a 30 & thru 140 mesh sieve

[14]

Changes & Repairs made on Loading Machine

August 11th 1913. New feed slide to hydrate hopper.

September 10th 1913. New tamping rod, and revolving hopper repaired

March 25th 1913 Replacing set screw

April 1st 1913 Repairing bag.

October 3rd 1913 Micrometer set screw adjustment to slide for hydrate feed

March 24th 1914 Up to this date, it had been customary to top hydrate hopper, while taking the 10 dumps, to get weight per 10 dumps, but from this date on it was decided to eliminate the topping

March 26th 1914 New dasher (stirrer) to replace old one in Flake hopper

March 28th 1914. It was found that the system adopted 24th inst for obtaining the 10 dumps preparatory to actual loading was not good as of weights increasing after each tube was loaded, so it was decided to top hopper for one minute, & then take 10 dumps

March 31st 1914 Reverted to old style of taking 10 dumps

i.e., tapping hydrate happen while as doing
A special standard hydrate #1873 & 74 (Factory
lot #6+9) to be used for checking loading
weights, if necessary, after readjusting machine,
with special samples.

April 9th/14 Upper part of tamping rod enhanced

" 6/14 Mill for grinding hydrate put into service
instead of grinding by hand as heretofore

June 27th/14 Use of mill discontinued from the date
under instruction from Dr E. (for J. V. Mills)
& old method of grinding with pestle & mortar
reverted to.

June 16th/14 loading machine transferred to Tube &
inspection Dept. under W. Cochrane supervision

June 19/14 Starting with Reg #481 all tubes are
being reamed, before being taken out of
mould after loading. The variation in
weight due to reaming was from 80 to 190
milligrams, when taken in different tubes.

July 7/14 All samples to be dried for 1 hour, before
loading, @ 212°F. This starts with $Ni(OH)_2$
(Reg) #378 & Experimental #1944.

July 21st 1914 Starting with sample $Ni(OH)_2$ #5800
all samples will be dried in vacuo pas were
initiated in Tube inspection Dept instead of
in Dr Greenley's Dept as before.

Forming treatment for Plates @ 130°F

SEP 1 2 1910

All Plates that are to be used in assembling with "Test" cells are to receive the following treatment.

Assemble in "B6" containers using metal strips for the positive element. 11 Strips to 10 pockets, fill with 21% KOH + 11.2 grams Li_2O per liter, put in hot box, and warm electrolyte up to 130°F

Then give 2 Hours, charge 15 hours @ 2 Amperes, and discharge for 9 hours @ the same rate

Plates are now ready for use, and are to be kept immersed in solution until they are assembled with the test cells, and this must be done as quickly as possible, to avoid unnecessary exposure to the air.

August 12th 1909

Regular Forming Treatment #3 (A+ Cells)

In each new cell put 20 grams dry $LiOH$ then fill with 1400 CC 21% KOH containing 50 grams KOH per liter equal to 90 grams $LiOH$ per OH cell.

Let soak @ least 15 hours.

Run #1 Charge 48 hours @ 15 Amps. Discharge @ 30 Amps to .5V

Run #2 Charge 10 hours @ 30 Amps and 14 hours @ 15 Amps. Discharge @ 30 Amps to .5V

Run #3 Same as Run #2

Run #4 Charge 15 hours @ 30 Amps. Discharge @ 30 Amps to .5V

Run #5 Same as #4. To be given only when run #4 comes after standing

Data on Reports & Records for Small Cells

Short tubes

Made up out of anything but iron and are 3" long & ¾" dia. Assembled with excess iron (2 pockets) in short can & run regularly in 21% KOH + 11.2 grams $LiOH$ per liter or 21% + 2 grams $LiOH$ per 175 C.C.

Special long tubes (which are made up in factory) may be run under short tube rules & under same schedule for tube (see long tubes) which are

Normal Run Rates (Room Temp.)

Charge 15 hr @ 400 M-A } 3 Runs
Discharge @ 250 M-A to .9V

Hot test Rates

Charge & Dis. @ 300 M-A to 1.1V
Rep same avg ~~300~~ M-A.

Special long tubes

All nickels that are used for testing Fe, and Fe that are used for testing nickels, are to be discarded after being in service for 6 months, the finish of same to be stamped, so that there will be no difficulty in stating the actual month & year they were first placed on test.

Nickels do not start a new cycle on Thursday PM age of cauning stand between 2nd & 3rd run & Fes do not start a new cycle Friday PM age of cauning stand between 7th & 8th run

3-19-1915 All short tubes are to be inspected for physical condition after every cycle of normal & hot runs, same to be noted on records whether OK or defective

3/29/15 When changing solution the amount of sediment, if excessive is also to be recorded

(34)

Regular order of Tests for St Cells.

After the forming runs, give 3 or 4 normal efficiency tests (7 hour charge @ 30 Amps, discharging @ 30 Amps to 1.V)

Then give 12 Endurance Runs (charging 7 hours @ 30 Amps, discharging @ 40 Amps to 5V & short circuiting) counting the efficiency tests above as Endurance runs

Then give 3 overcharge runs, 15 hours @ 30 amps, discharging @ 30 Amps to 5V

Repeat this cycle of efficiency tests, endurance & overcharge runs 4 times, just as noted above, (48 Endurance runs), after that, run the same way but giving 50 Endurance runs (including efficiency tests) between the normal overcharge runs

After 225 runs (total, more or less) fresh solution is to be put in all the cells, and unless otherwise specified, then will be 21% KOH + 20 grams Li OH per liter. The fresh solution is to be put in

after the normal overcharge tests and efficiency tests which come nearest to the 225th run; and then the cell is to be given 3 normal overcharge runs & 3 or 4 normal efficiency tests in the new solution before putting it back on the endurance test. (225 - 450 - 675 - 900 - 1125 - 1350 - 1575 - 1800 - 2025)

December 17th 1910

Note the following change in the regular order of running Stationary Bell for Endurance.
Hereafter, cells will have only two series of 12 endurance runs to begin with, then one series of 25, thereafter 50 endurance runs will be given as usual.

Dec. 6th 1910

Renewal solution is now 25% H_2O_2 + 15 grams K_2 O_H per liter.

DEC 15 1914

Forming treatment #3 which was in operation previous to March 10th 1911 again reverted to, all later ones being discontinued.

March 10th 1911

Regular Forming treatment #5 (Stationary Bells)

Run #1 Charge 30 hours @ 20 Amperes, discharge @ 30 Amps. to .5V

Run #2 Charge 15 hours @ 30 Amps. discharge @ 30 Amperes to .5V

Run #3 Same as #2

Regular Forming Treatment #6. June 6/11

Run #1. 30 hrs @ 20 Amps. Run #2 15 hrs @ 30 Amps. then regular series Overchg. & Efficiency Note

All overcharges will be for 12 hours @ 30 Amps. instead of 15 hours @ 30 Amps, as heretofore.

Sp. gr. Readings to be taken on All types of cells, on the 1st & 2nd Charge of each cycle of Overcharge Runs.

Regular Forming Treatment for "B" & bell.

In each new cell put ~~50 grams~~ hi OH then fill with ~~(50 cc)~~ 21% KOH + 50 grams plus 1½ OH per liter equal to 50 grams KOH per B+ bell.

Run #1 charge 30 hours @ 10 Amps, discharging for 3 hours @ 16 Amps.

Run #2 Charge 9 hours @ 16 Amps, discharging for 3 hours @ 16 Amps.

Run #3 Same as #2

Run #4 Charge 9 hours @ 16 Amps, discharging 16 amps to .5V.

Runs #5-6-7 Charge 12 hours @ 16 Amps. discharging @ 16 Amps to .5V

Dec 10 1910

Table of Sp. Gr. Correction @ temperature from 65°F to 110°F

21% KOH straight

Corrections give values correct @ 65° F

Temp. of Solution °F		Temp. of Solution °F		Temp. of Solution °F	
65	add 0	82	add .0034	99	add .0068
66	" .0002	83	" .0036	100	" .0070
67	" .0004	84	" .0038	101	" .0072
68	" .0006	85	" .0040	102	" .0074
69	" .0008	86	" .0042	103	" .0076
70	" .0010	87	" .0044	104	" .0078
71	" .0012	88	" .0046	105	" .0080
72	" .0014	89	" .0048	106	" .0082
73	" .0016	90	" .0050	107	" .0084
74	" .0018	91	" .0052	108	" .0086
75	" .0020	92	" .0054	109	" .0088
76	" .0022	93	" .0056	110	" .0090
77	" .0024	94	" .0058		
78	" .0026	95	" .0060		
79	" .0028	96	" .0062		
80	" .0030	97	" .0064		
81	" .0032	98	" .0066		

When discharging cells @ rates higher than normal, instead of discharging to 1.00 Volt, discharge .10 Volt lower when rate is double normal, & so on pro rata.

Explanation of Reactions in the Edison Storage Battery

Passage of current decomposes the electrolyte (KOH) setting free OH @ the anode & K @ the cathode.

The active materials of the electrodes react with this somewhat as follows. (Charge & discharge)

$$8.OH + 3Fe = Fe_3O_4 + 4H_2O \text{ (Negative)}$$

$$8K + 6NiO_2 = 2Ni_3O_4 + 4K_2O \text{ (Positive)}$$

8KOH — Charged condition. — Discharged condition. — Forms 8KOH.

Note. The Fe & Ni Oxides probably are hydrated but are treated as true Oxides for the sake of simplicity.

List of "Hot Cells on Life" Test receiving Special Treatment

So 18 & So 19 - Charge continuously during both charge & discharge of rest of cells while running on Endurance, after which give Overcharge & Efficiency discharging in the regular way. Measure amount of water added to each cell while running in Endurance

15331 Discharges to 1.00 Volt only on all Efficiency & Endurance runs & .50 V on Overcharge

15334 Sealed in Endurance 72, no water to be added & when capacity is 130 A-H to .5 V take out, measure depth solution is below tops of plates & how much distilled water is necessary to bring to 1/2" above tops of plates.

15654 Add water from faucet to cell when necessary instead of distilled water, measure amount

50066 Once a week add 100 CC of sea water ("50065" filled as required with distilled water) when running & pro rata for each part of week.

50050 & 81 Fill when necessary with natural melted ice water.

72095 & 72130 Run on Endurance charging only, standing while rest of cells discharge, after which Overcharge & Efficiency discharging regularly

Voltage & specific readings to be taken @ the end of every charge

(SURVEY 1919 TO 1920 INVITE NO ENDORSING)

1324 A & 1326 A Run continuously on Overcharge & discharge to 1. Volt only except @ start of every 50 runs when 8th electrode readings will be taken & cells discharged to .5 V for 3 runs.

1338 A & 1341 A Run continuously on Efficiency & discharge for 3 hrs only, except @ start of every 50 runs when 3rd electrode readings

85 Same as in Endurance

will be taken & cells discharged to 0.5 V for 3 hrs.

Sept 25th 1915

1st Filling solution changed from 21% KOH + 50 grams Li OH per liter, to — 15% Na OH + 50 grams

SDK solution 15% Na OH + 35 grams Li OH per liter.

Soda to be used for 1st filling only. Renewals to be made with standard potash renewal solution.

March. 1912

Regular Forming treatment for H & M type

Electrolyte. 21% KOH and Li OH in proportion to .375 gram per short tube for H type and .750 gram per long tube for M type.

Type	Capacity	Normal Rate	[illegible]	
M Ha	1.1	.25	[illegible]	Charge 3-12 hrs
M Hb	2.25	.50	[illegible]	Charge @ normal
M H8	4.5	1.0	[illegible]	Mak making
M H12	6.75	1.5	[illegible]	total of 6 hours
M H20	12.5	2.5	[illegible]	Discharge @ normal
~~M H25~~	~~10~~	~~5.0~~	[illegible]	
~~M H32~~	~~16~~	~~5.0~~	[illegible]	Mak to 0.5 V all units

Dec 16th 1914

Forming treatment for this type of cell to be in accordance with schedule of Dec 14/14 for L type cells.

Jan. 4th 1915

2 Forms Mar manufactured. Case of negative 5% high. Can of Hard fol about 1/4" higher. 1st filling for Neg. 21% KOH + 50 gr. Li OH per liter to 1/4" above top of plate. Neg. lines. 1st filling for Hard fol 17% KOH + 35 grams Li OH per liter 1/2" above top of plate. Neg. Li OH.

3/4/15 Renewal of fol Hard fol Mar. 19.5% KOH + 15 gr. Li OH per liter.

Jan 18th 1912

"C" Type Data.

Normal Charge 3 3/4 hours.
Do. Discharge 8 hours.

Type	Rated Capacity	Normal Rate	Continuous Rate
C7	140 AH	50 Amps.	65 Amps
C8	160 "	55 "	75 "
C10	200 "	70 "	95 "
C12	240 "	85 "	110 "
C14	280 "	100 "	135 "

Bismuth cells which discharge to
·9V instead of 1.00 volt on Efficiency tests

Set I
15646
18866-7
18870
18871 with 19838 regular
18872-3
18874-5 with 19839 regular
25428
25429
25430
25431

G. & J. Type Cells.

January 13th 1915

Forming Treatment

Run #1 30 hours @ 1/2 normal rate

Run #2 7 hours @ normal rate
10 " @ 1/2 " "

Run #3 Same as Run #2

Run #4 10 hours @ normal rate

All discharges @ normal rates to 5 V

Making

"J" Type 3.75 Amperes per plate
"G" " 7.50 " " "

First filling solution

"J" Type 21% KOH + 8.5 grams Li OH per plate
"G" " " + 16.0 " " " "

Dies for Pressing & Crimping Pes.

Pairs	Type	Form	Mark
One	B	Edge crimp	B type
"	A	Corrugating	882 and 8.G
"	A	"	Die A & 5G
"	A	Edge crimp	8 } not in
"	B	" "	B } frames
"	A	" "	2
"	"	" "	4
"	"	Window pattern	5
"	"	Convex	8GC
"	"	Flat { were once convex }	
"	"	Corrugating	8.G.

July 3rd 1914. Under instruction from D.A.E., A Mk I made up a new die for pressing the flat & crimping the edges called "1".

July 7th 1914. Die "1" changed so that there was two grooves in centre of pockets & number changed to "14". Mk I "3" was to press pockets first with convex die @ 3.26 tons, then with Mk I "2 die @ 5 tons.

* Aug 24th 1915 Die "882" (8 plans) shallows corrugation than 8.G

* Jan 6th 1913. Drawings were passed for making up a new die with the corrugations shallower, & die made & put into service in Factory only

July 7th 1914 Die "8" same as "14" only diff. in centre.

Aug 18th Die "Bigs" "8" & "B" similar to "14" only made in Footscray but by Ireland

Sept 24th 1914 Die "5" made up by Mk I for window pattern

Sept 8th/15 Die A & 5G for corrugating 5 plane pockets

Die 8.G.C. convex for shaping pockets before pressing with corrugated die. The use of these was discontinued in May (approx) 1913 as this was not being done in Factory

Flat die (originally convex) was used in conjunction with dies made by A Mk I

over →

Nos 8, 9, 10 Steel dies are used for proving all
D.B. Spring Fo, these marked 882, 886
which were made to correspond with the die
adopted in Factory after June 15 last being
put into service, so the standard for elevation
test would be changed.

Notebooks by Experimenters Other Than Edison
Group 2: Storage Battery Endurance Tests

The 399 books in this group cover the period April 1903-December 1914, although there are several books with entries from as late as 1917. They were used by Edison employees, including Alvin D. Caskey, Ignacy Goldstein, Walter E. Holland, George H. Hooper, Jr., and Joseph W. Valentine, to record endurance and efficiency tests performed on storage batteries or to record testing conditions. There are many entries initialed by Edison, as well as occasional marginal notations by him, which indicate his attention to their work. Among the cells tested are experimental and production versions of Edison types A4, A6, A8, B2, B4, and E18, along with several competitors' cells. The tests pertain to variations in cell performance under different charge and discharge conditions and according to differing compositions or constructions of cells and cell components. Labels on the front covers of some of the books contain notes by Edison regarding the importance of the data contained therein. The notebooks are arranged in four subgroups: (1) General Endurance Tests (304 books); (2) Tube Tests (58 books); (3) TAE Reports (30 books); and (4) Goldstein Nickel Hydrate Books (7 books).

A sample from fourteen books in the first subgroup has been selected. Partially selected books are indicated by a bracketed number noting the approximate percent of pages selected. The selected entries provide examples of test and report formats common to many of the books. None of the books from the other three subgroups have been selected. The information in the tube test books is similar to that found in the tube test books begun by Edison (see Notebooks by Edison and Other Experimenters). The TAE reports contain data transcribed for Edison from earlier tests. The Goldstein books relate to the preparation and use of nickel hydrate in cells. A partial overview of test results can be found in the graphs in the Cell Test Books (Miscellaneous Notebooks).

General Endurance Tests: Selected

N-Number	Label on Front Cover
	[additional information supplied by the editors appears in brackets]
05-01-03	"Sec. 1 Small Cell Endurance Test 1/3/05" [10%]
05-06-00	"Special Tests R.A. Iron 270A-320A Vol I"
05-06-13	"Hot Endurance Test Secs #2,3,4,& 5 Vol. 1" [50%]
05-08-24.1	"'A4' Endurance Test Hot Vol I 8/24/08" [10%]
06-03-10	"Hot Endurance Tests Tables I & II Sec. 1,2,3,4 Mar. 06" [5%]
06-08-27.1	"E18 Cells Endurance Readings 8/27/06" [10%]
06-11-08	"Tubes Efficiency Tests Vol. 1 11/8/06" [20%]
07-05-01	"Reports and Tabulations Vol. 1 5-1-07"
07-08-05	"Tubes Efficiency Tests Vol. 1, Cont'd. 8/5/07"
08-12-22.1	"A4 Cell #398 Vol. I 12/22/08"
09-02-26.2	"A4 Cell #398 Vol. II 2/26/09"
09-05-06	"A4 Cell #398 Volume III"
09-05-20	"Endurance Book (A4 Cells) Volume I 5/20/09-"
10-07-23	"A Type Cells Miscellaneous Tests Vol. II 7-23-10"; "A4 1792; 2046; 2078 2168 & 18867A A6 210, 231, 239, 4931 A8 1682, 1315, 1670, 1696" [50%]

General Endurance Tests: Not Selected

N-Number	Label on Front Cover
03-04-00	"Special Tests"
04-08-04	"Studebaker Endurance Cells Silver Lake & Lab 8/4/04"
04-09-16	"Experiments on Charge Meter Silver Lake & Lab 9/15/04"
04-10-05	"Loss of Capacity Tests & Treatments Vol. 1 10/5/04"
04-10-19	"Miscellaneous Vol. 1 10/19/04"
04-10-21.1	"Loss of Capacity Tests and Treatments Vol. 2 10/21/04"
04-10-26	"Loss of Capacity Tests and Treatments Vol. 3 10/26/04"
04-11-03	"Large Cell Endurance Tests Vol. 2 11/3/04"
04-11-07.1	"T.A.E. Sp. Fe Exp. 11-7-04 to 11-10-04"
04-11-08	"Large Cell Endurance Tests Vol. 3 11/8/04"
04-11-09	"E-18 Cells"
04-11-12.1	"Calipers Vol. 1 11/12/04"
04-11-15	"Large Cell Endurance Tests Vol. 4 11/15/04"
04-11-20	"Loss of Capacity Vol. 4 11/20/04"
04-11-25	"Large Cell Endurance Tests Vol. 5 11/25/04"
04-12-12.1	"Room 1 Run Book Vol I From Dec 12-04 to Mar 22-05"
04-12-12.2	"Room 2 Run Book Vol I"
04-12-15	"Loss of Capacity -- Vol. 5 12/15/04"
04-12-18	"Directory of Small Cells 12/18/04"
05-01-08	"Large Cell Endurance Tests Vol. 1, continued"
05-01-15	"Large Cell Endurance Tests Vol. 3, continued"
05-01-17.2	"Secs. II and III Small Cell Endurance Test 1/17/05"
05-03-13.1	"Large Cell Endurance Tests Vol. 6 3/13/05"
05-03-13.2	"Experiments on Can Readings Vol 1 3/13/04"
05-03-23	"Room 1 Run Book Vol II From Mar 23-05 to July 20-05"
05-04-11	"Room 2 Run Book Vol II"
05-04-21	"Large Cell Endurance Tests Vol. 7 4/21/05"

05-04-28	"Large Cell Endurance Tests Vol. 8 4/28/05"
05-05-08	"Hot Endurance Test Section 1"
05-05-16	"Experiments with Fe plates Vol 1"
05-05-23	"Experiments with Ni Plates Vol 1"
05-06-06.1	"Regular Tests 4409-4719"
05-06-25.1	"Calipers Vol III From June 25 to "
05-07-21	"Room 1 Run Book Vol 3 From July 21, 1905 to "
05-07-26	"Hot Endurance Test Secs #6 & 7 Vol 1"
05-07-29	"Hot Endurance Test Secs #2, 3, 4 & 5 Vol. 2"
05-08-09	"Room II Run Book Vol III From Aug 9th 1905 to Jan 11-06"
05-08-24.2	"Regular Tests 4720-5013"
05-08-28	"Hot Endurance Tests Secs 2, 3, 4 & 5 Vol III"
05-09-30.1	"Hot Endurance Test Secs. 2, 3, 4, & 5 Vol 4"
05-09-30.2	"Hot Endurance Test Secs 6 & 7 Vo[- --]"
05-10-18	---
05-10-30	"Hot Endurance Test Secs #2, 3, 4, & 5 Vol 5"
05-12-04.2	"Hot Endurance Test Secs. 2, 3, 4, & 5 Vol 6"
05-12-26	"Hot Endurance Test Secs 6 & 7 Vol 3"
06-01-12.1	"Battery Not Very Important"; "Iron Run Book Vol 1"
06-01-12.2	"Nickel Run Book Vol 1"
06-01-26	"Hot Endurance Tests Secs. 2, 3, 4, & 5 Vol 7"
06-03-08	"Hot Endurance Tests Tbles III & IV Sec. 5, 6, 7, & 8 Mar. 06"
06-04-00	"Iron Hot Endurance Vol I"
06-04-01	"Special Tests on Cells E764 E765 E766 Apr 1-1906"
06-04-11	"Hot Endurance Tests Tables I & II Secs. 1, 2, 3, & 4 April 1906"
06-04-21	"Hot Test Apr. 21st 1906 to"
06-05-18.1	"Nickel Run Book Vol II May 18 1906"
06-07-12	"Miscellaneous Low Eff. E27 Cells Varied Press E18 Cells Rise of Temp. Tests Low Cap. D Cells 7/12/06"
06-08-08.1	"E18 Cells Pressure Varied on Ni Plate Cap. & Eff. Runs 8/8/06"
06-08-15	"Iron Run Book Vol II"
06-08-27.2	"Miscellaneous Readings & Tests Vol. II 8-27-06 -- 11-9-06"
06-08-28.1	"Nickel Run Book No. 3"
06-08-28.2	"Auxiliary Electrodes 8/28/06"
06-09-01.3	"Ni Tube Run Book No. 1"
06-09-11.1	"Low Capacity Vol 6 9/11/06"
06-09-24	---
06-11-05	"Bergmann Cell Type E27 11/5/06"
06-11-26	"Low Capacity Vol 7 11/26/06"
06-12-28	"Fe Book No II 13128 to 15848"
07-03-01	"Tubes Efficiency Tests Vol 2 3/1/07"
07-03-28	"Tubes Efficiency Tests Vol 3 3/28/07"
07-04-03	"Room Temperature 4/3/07"
07-04-10	"Temperature Effect on Storage Battery 4/10/07"
07-04-24	"Tubes Efficiency Tests Vol 4 4/24/07"
07-05-03	"Low Capacity Vol 8 5/3/07"
07-05-09	"Tubes Efficiency Tests Vol 2A 5/9/07"
07-05-21.1	"Silver Lake Fe Book No. 3"
07-05-21.2	"Low Capacity Vol 9 5/21/07"
07-06-29	"Hot Test June 29-1907 Mar 2-1908"
07-07-08	"Hot Tests"; "Temperature"
07-07-13	"Tubes Efficiency Tests Vol 2B 7/13/07"
07-08-27	"Dr F. W. Weber"; "Special Solutions"; "Book #2"
07-09-22	"Experiments on Fe by Volhard Volume 1 9/22/07"

07-10-01	"New Type 'A' Positive Plate 10/1/07"
07-10-04	"Experiments on Fe by Volhard Vol. 2 10/4/07"
07-10-16	"New Type 'A' Miniature Cells. Miscellaneous 10/16/07"
07-10-17	"New 'E' Cells Special Tests Vol. 1 10/17/07"
07-10-18	"Low Capacity Vol 10 10/18/07"
07-11-07.1	"Low Capacity Vol 11 11/7/07"
07-11-11	"Dr F.W. Weber"; "Special Solutions Book No 3"
07-11-26	"Tubes Efficiency Tests Vol. 3, Cont'd."
07-12-12	"Tubes Efficiency Tests Vol. 4, Cont. 12/12/07"
07-12-23	"Type 'E' Miniature Cells Miscellaneous 12/23/07"
08-01-02	"'E' Cells Special Tests Vol 2 ½/08"
08-01-09	"Tubes #8701-12 Special Tests 1/9/08"
08-01-21.1	"Special Runs G.H.H."
08-02-10	"LiOH from Drum in these cells"
08-03-05.1	"'Exide' Accumulator 3/5/08"
08-03-05.2	"'National' Accumulator 3/5/08"
08-03-10	"'Philadelphia' Accumulator 3/10/08"
08-03-12	"Hot Test Mar 2-1908 to"
08-03-23	"'Willard' Accumulator 3/23/08"
08-04-13	"A-4 Cells #10 and #11 4/13/08"
08-04-14	"A4 Cell #391 11/14/08"
08-04-29	"Minature Fe Cells Bismuth Effect #683 & 684 A-C 4/29/08"
08-05-12	"Heat Effect Tube Cells #685 & 686 A-C 5/12/08"
08-06-01	"Hot Test Temperature June 1, 1908 to"
08-06-05	"Tube Cells Cold Experiments #687 & 688 A-C 6/5/08"
08-06-25	"A-4 Cells #174 & #175 6/25/08"
08-06-27	"Tube Cells Heat Experiments 9654-59 9647 712 W.E.H. Vol #1 6/27/08"
08-07-01	"A-4 Cells #291 292 [*illegible*] 7/1/08"
08-07-07	"Tube Cells Discharge Terminated at Different Voltages. #694-698 7/7/08"
08-07-22.2	"'A4' Cells #365 366 367 7/22/08"
08-07-29	"A4 #311 7/29/08"
08-08-05	---
08-09-08	"'A4' Cells 231 232 9/8/08"
08-09-24.1	"Tube Cells Heat Experiments 9654-59 9647 Vol #2 9/24/08"
08-09-24.2	"A4 Cells #368, 369, 370 9/24/08"
08-10-05.1	"A4 Cell #376 10/5/08"
08-10-05.2	"A4 Cells #374 & #375 10/5/08"
08-10-09	"A4 Cells #377, 378, 379 10/9/08"
08-10-10	"'A4' Endurance Test Vol II Hot 10/10/08"
08-10-16.1	"A4 Cell #381 10/16/08"
08-10-16.2	"A4 Cell #382 10/16/08"
08-10-21	"A4 Cell #386 10/21/08"
08-10-24.1	"A4 Cell #380 10/24/08"
08-10-24.2	"A4 Cell #383 10/24/08"
08-10-27	"A4 Cell #384 10/27/08"
08-10-28	"A4 Cell #385 10/28/08"
08-10-31	"A4 Cell #390 10/31/08"
08-11-01	"A4 Cell 389 11/1/08"
08-11-07.1	"A4 Cell #387 11/7/08"
08-11-07.2	"A4 Cell #71 From Test Car 11/7/08"
08-11-07.3	"A4 Cell #22 & 72 From Test Car 11/7/08"
08-11-10	"A4 Cell #388 11/10/08"

08-11-16	"Ni Plates Type 'E' 11/16/08"
08-11-18.1	"A4 Cell #392 11/18/08"
08-11-18.2	"Ni Plates Type 'A' 11/18/08"
08-11-18.3	"A4 Cell #393 11/18/08"
08-11-21	"A4 Cell #394 11/21/08"
08-11-23	"'A4' Endurance Test Vol III Hot 11/23/08"
08-11-24.1	"Exp. No. 1. G.H.H.Jr 1908"
08-11-24.2	"A4 Cell #399 11/24/08"
08-11-26	"A4 Cell #400 11/26/08"
08-11-29	"A4 Cells From Phonograph Co's. Truck #80, 87, 117, 135 11/29/08"
08-12-04	"A4 Cell #401 12/4/08"
08-12-07.2	"A4 Cells From Test Car #14, 21, 23 12/7/08"
08-12-09	"A4 Cell #402 12/9/08"
08-12-11	"A4 Cells #291, 292, 294 Vol II 12/11/08"
08-12-13.1	"A4 Cell #396 Vol 1 12/13/08"
08-12-13.2	"A4 Cell #395 12/13/08"
08-12-15	"Tube Cells Heat Experiments 9654-59 9647 Vol III 12/15/08"
08-12-17	"A6 Cells #6, 16, 32 12/17/08"
08-12-22.2	"A4 Cell #397 12/22/08"
09-00-00.4	"Calipers Calipers Vol 2 Vol 2 3/17/05"
09-01-01.2	"Temperature Jan 1909-July 1909 Hot Test Also Dec 17-31-1908"
09-01-05	"A4 Cell #403 1/5/09"
09-01-07	"Daily Record of Cells Put Up By F W G"
09-01-14	"A4 Cells #478-#480 Volume II"
09-01-21	"A4 Cell #404 Vol I 1/21/09"
09-01-22.2	"'A4' Endurance Test Vol IV Hot 1/22/09"
09-02-02	"'A' Type Miniature Cells Miscellaneous Vol II 2/2/09"
09-02-03.1	"'A4' Cells #466 & 467 2/3/09"
09-02-03.2	"A4 Cell #468 2/3/09"
09-02-25.2	"Journal Feb. 22, 1909"
09-02-26.1	"A4 Cells New-Loaded #478, 479, 480 2/26/09"
09-02-27	"A4 Cell #396 Vol II 2/27/09"
09-03-06	"A4 Cells New-Loaded #481, 482, 483 3/6/09-"
09-03-12	"A4 Cells New-Loaded #484-489 Vol. 1 3/12/09-2/3/10"
09-04-22.1	"A4 Cells #568-570 New-Loaded 4/22/09"
09-04-22.2	"A4 Cells #551-553 New-Loaded 4/22/09"
09-04-24	"A4 #404 Vol. II 4/24/09-"
09-04-25	"Hot Test Apr 25 1909"
09-05-14.1	"A4 Cells #466-#468 Vol II 5/14/09"
09-05-14.2	"A4 Cells #469 643 646 775 (later) Vol I 5/14/09"
09-05-14.3	"A4 Cells #773-#775 Special Insulators Vol I 5/14/09"
09-06-08	"Special A4 Cells B1-B3 Vol I 6/8/09"
09-07-01.1	"Hot Test Temp."
09-07-01.2	"A4 Cells #1575-#1577 Vol 1 7/1/09"
09-07-02.1	"Readings July 2, 1909 to Dec 12 1910"
09-07-27	"Endurance Book (A4 Cells) Volume 2 7/27-1909-"
09-07-29.1	"A4 Cells #2314-2316 Vol I 7/29/09"
09-07-29.2	"A4 Cells #2310-2313 Vm I 7/29/09"
09-08-04.1	"A4 #2317 Vol I 8/4/09"
09-08-04.2	"A4 #2321 8/4/09"
09-08-05.1	"A4 Cells #643, #646, #775 Vol 2 8/5/09 to 10/5/09"
09-08-05.2	---

09-08-10	"A4 Cells #1576 1577 Volume 2 8/10/09"
09-09-03	"A4 #482 Vol II 9/3/09-"
09-09-04	"A4 Cells #2752-#2754 (Heavy Iron) 9/4/09-"
09-09-16	"A4 Cells #3011-#3013 Treated Iron 9/16/09"
09-09-28	"Endurance Book A4 Cells Volume 3"
09-09-30.1	"A4 Cells #3784-3786 Heavy Dump Hydrate Vol I 9/30/09"
09-09-30.2	"A4 Cells #3408 & 3549 Special Tube Stock Vol I 9/30/09"
09-10-05	"A4 Cells #643, #646, #775 Vol 3 10/5/09"
09-10-07.1	"Daily Runs on Long Tubes"
09-10-21	"Hot Test Oct 21 1909"
09-10-28	"A4 Cells #4711-4713 Vol I 10/28/09"
09-11-03	"A4 Cell--Special #4 Vol I 11/3/09"
09-12-08.1	"Endurance Book A4 Cells Volume #4"
09-12-10	"A4 Cells #643, #646 #775 Vol 4 12/10/09"
09-12-20	"Special A4 Cells B1 - B3 Vol-2 12/20/09"
10-01-02.2	"Hot Test Temperature Jan.-June 1910"
10-01-05	"Automobile Battery Tests Vol. I Jan. 5, 1910"
10-01-15	"A4 Cells Treated, Heavy Irons #10485 #10486 Vol 1 1/15/10"
10-01-17	"A4 #10487 Auxiliary BI Tubes Vol 1 1/17/10"
10-01-20.1	"A4 Cells #10794-10803 Book 1, Volume 1 1/20/10"
10-01-20.2	"A4 Cells #10794-10803 Book 2, Vol 1 1/20/10"
10-02-03	"A4 #488 Vol 2 2/3/10"
10-02-07	"Special Tests of A4 #643, #646, & #B1 Vol 1 2/7/10"
10-03-04	"A4 Cells #2310-2313 V-II 3-4-10"
10-03-18	"A4 Cell #568 Vol II 3-18-10"
10-04-02	"A8 Cells #2674 & #270 Vol I 4-2-10"
10-04-06	"Special Tests A4 Cells #643-646-B1, Vol II 4-6-10"
10-04-08.2	"A4 Cell 1575 Vol II 4-8-10"
10-04-16.1	"A4 Cell Special #5 Vol I 4-16-10"
10-04-16.2	"A4 Cells #15593-4-5 Vol I 4-16-10"
10-04-23	"B4 Ignition Cells (4 Ni Plates) #6, 7, 8, & 9 4/23/10"
10-04-26.2	"Miscellaneous Readings & Tests Vol IV 4-26-10"
10-05-05	"A4 Cells #478-9-80 Vol III 4- -10"
10-05-11.1	"A4 #15646 Special Bi Cell Vol I 5-11-10"
10-05-11.2	"A4 Cells 15327-15328 15331-15334 Vol I 5-12-10"
10-05-13	"Special Tests A4 Cell #483 5-13-10 Vol II"
10-05-17	"A4 Cells 2314-15-16 Vol II 5-17-10"
10-05-18.1	"A4 Cells 15647-8-9-50 Special Electrolytes Vol I 5-19-10"
10-05-18.2	"A4 Cells 15651-2-3 Special Electrolytes 5-18-10 Vol I"
10-05-20	"4 Endurance Book T.A.E. Fes. 4589-"; "Not very Important"
10-05-21.1	"A4 Cells #15654 Vol I 5-21-10"
10-05-21.2	"A4 Cells #15605-#15612 #15621-#15631 Vol I 5-21-10"
10-05-24	"A4 Cells #466-7-8 Vol III 5-24-10"
10-06-01.2	"A4 Cell #15655 Vol I 6- -10"
10-06-02	"3 June '10-Nov. '12 Silver Lake Fe Book Vol I"; "Not very Important"
10-06-09	"A4 Cell #15327 Temperature Test [6-]9-10"
10-06-11.1	"A8 Cells #267-#270 Vol II 6-11-10"
10-06-11.2	"A4 Cell #646 6-11-10"
10-06-20.2	"A4 Cell #15334 Special Tests Vol I 6-20-10"
10-07-01	"Large Cell Endurance Tests Type A"
10-07-12	"Hot Test Temps July-Dec. 1910"
10-07-14.3	"A6 Cell #13134 Special Tests 13178 - 7.11.11 7-14-10"
10-07-20	"A4 Cell #15328 Special Tests 7-20-10"

10-07-25	"A4 Cell Special #6 Vol I 7-25-10"
10-08-03	"A4 Cell #482 Vol III 8-3-10"
10-08-05	"Cut Out Record Book No I R.A., TAE & I.Goldstein"
10-08-11	"A4 Cell Special #7 Vol I 8-11-10"
10-08-15.1	"A4 Cells 2752-3-4 (Heavy Iron) Vol II 8-15-10"
10-08-15.2	"A4 Cell #2317 Vol II 8-15-10"
10-08-15.3	"A4 Cells #3011-12-13 (Treated Iron) Vol II 8-15-10"
10-08-21	"A8 Cells #267-#270 Vol III 8-20-10"
10-08-24.2	"Car Lighting Set of Five 'A8' Cells"
10-08-25.1	"'A4' Cell #15334 Special Tests Vol II 8-25-10"
10-08-25.2	"A-4 Cell #7341 Vol II 8-25-10"
10-10-03	"A8 Cells 1079-1815 Special Tests Vol I 10-3-10"
10-10-05	"A4 Cell Special #6 Vol II 10-5-10"
10-10-19	"A4 Cell 7341 10/19.10 Vol III"
10-10-22.1	"A4 Cells #4711-12-13 Vol II 10-22-10"
10-10-25	"A4 Cell #17983 Vol I 10-25-10"
10-10-26.1	"Idle Temperatures 10.26.10"
10-10-26.2	"Hot-Test Sections 10/26/10-6-10-12"
10-11-03.1	"A4 Cell #18869 Special Tests Vol I 11-3-10"
10-11-03.2	"A4 Cell Special #7 Vol II 11-3-10"
10-11-03.4	"A4 Cell #775-Vol V Continued From A4 Cells #643-#646-#775 Vol IV 11-3-10"
10-11-04	"A4 Cell #15334 Special Tests Vol III 11-4-10"
10-11-07	"A8 Cells #267 & #270 Vol IV 11-7-10"
10-11-08	"Miscellaneous Tests"
10-11-16	---
10-11-21	"A4 Cell Special #6 Vol III 11-21-10"
10-12-14	"Automobile Battery Tests Vol II Dec 14, 1910"
10-12-15	"A4 Cell #7341 Vol IV 12-15-10"
10-12-19	"A6 Cells 27347-27353-27371-27438 Vol I 12-19-10"
10-12-24.1	"A4 Cells 10794-10803 Book #1 Vol II 12-24-10"
10-12-24.2	"A4 Cells 10794-10803 Book #2 Vol II 12-24-10"
10-12-28	"A6 Cells 8460 8467 28053 28356 Vol I 12-28-10"
10-12-29	"B2 Cells 347-Thro-356 Special Tests Vol I 12-29-10"
11-01-01	"Temperatures, Year 1911, Vol I, January-June 1911"
11-01-25.1	"A4 Cell Special #7 Vol III 1-25-11"
11-01-25.3	"A4 Cell Special #6 Vol IV 1-25-11"
11-02-03	"B2 Cells 347-Thro-356 Special Tests Vol II 2-3-11"
11-02-11	"A4 Cell #7341 Vol V 2/11/11"
11-02-25	"A4 Cells Treated heavy irons #10485 #10486 Auxiliary Bi. Tubes #10487 Vol II 2.25.11"
11-05-19	"Idles & Air Temperatures, May 15, 1911"
11-07-01	"Temperature, Vol II, Of Year 1911, July-Dec 1911"
11-10-18.2	"A4 Cells 2752-3-4 (Heavy Iron) Vol III 10/18/11"
11-11-16	"Miscellaneous Readings & Tests Vol V 11.16.11"
11-12-03	"Room & 'Idle' Temperatures. Dec. 3-1911"
12-01-01	"Temperature Year 1912, Vol I, January 1-June 30"
12-06-18.1	"Room & Idle Temperatures June 18, '12. Monday"
12-07-01	"Temperature book, July '12 To Nov 19, '12"
12-11-19	"Room Temps"
12-11-23	"Silver Lake Fes Volume 2 Nov '12-Jan '14"
13-01-31	"Record of Room outside and Hot Test Table Temperature. January"
13-07-08	"Jul 8 1913 Temperature Book Small Cells"

13-08-02	"Record of Room Outside & Hot Test Tables Temperature Aug 1–"
14-02-13	"Temps"

Tube Tests: Not Selected

Book #	N-Number	Label on Front Cover
1	Undated.15	"1 to 349"; "Hot Endurance Book #1"; "Old Numbers 1-349, & No. 1"
2	06-02-24.2	"350"; "900"; "Hot Endurance Book #2 2-24-06 to"; "350-900, No. 2"
3	06-05-18.2	"901"; "1300"; "Hot Endurance Book #3 5-18-06 to"; "900-1300 No. 3"
4	06-07-14	"1301"; "1699"; "Hot Endurance Book #4 7-15-06 to"; "1300-1700 No. 4"
5	06-08-31	"1700"; "2252"; "Hot Endurance Book #5"; "1700-2250 No. 5"
6	06-12-17.1	"2300"; "2499"; "Hot Endurance Book 6"; "2253 to 2299"; "2250-2500, No. 6"
6½	06-12-17.2	"2200"; "2500"; "Hot Endurance Book #II"; "2200-2500, No. 6 ½"
6¾	07-01-28.4	"1-2500"; "5000-5415"; "Hot Endurance Book #I"; "1-2500 & 5000-5415 No. 6 3/4"
7	06-09-01.1	"2500"; "3640"; "Hot Endurance Book 7-A Fes"; "Not Important"; "2500-3640 No. 7"
8	07-06-26	"3641"; "Hot Endurance Book 7-B"; "Battery Important"; "3641- No. 8"
11	07-01-11.2	"5000"; "5499"; "Hot Endurance Book #IIII Jan. 11-1907"; "5000-5500 No. 11"
12	07-02-13	"5416 5500"; "5999"; "Hot Endurance Book #V Feb. 12, 1907 Feb. 13th 1907"; "5500-6000, No. 12"
13	07-04-05	"6000"; "6499"; "Hot Endurance Book #VI Apr. 5, 1907"; "6000-6500 No. 13"
14	07-06-03	"6500"; "6999"; "Hot Endurance Book #VII Jun. 3, 1907"; "6500-7000, No. 14"
15	07-07-26	"7000"; "7499"; "Hot Endurance Book #VIII Jul. 26, 1907"; "7000-7500, No. 15"
16	07-09-18	"7500"; "7999"; "Hot Endurance Book #IX Sep. 18-07"; "7500-8000 No. 16"
17	07-10-25	"8000"; "8499"; "Hot Endurance Book #X Oct. 25, 1907"; "8000-8500 No. 17"
18	07-12-15	"8500"; "9000"; "Hot Endurance Book #XI Dec. 15, 1907"; "8500-8900 No. 18"
19	08-01-24	"9000"; "9500"; "Hot Endurance Book #XII Jan. 24, 1908"; "9000-9500 No. 19"
20	08-04-23	"9500"; "9999"; "Hot Endurance Book #XIII Apr 23 1908"; "9500-10,000 #20"
21	07-10-09	"10,000"; "10,500"; "Hot Endurance Book #XIV Oct 9-1907"; "10,000-10,500 No. 21"
20A	08-07-22.1	"1A"; "499A"; "All Cells in this Book are A"; "Hot Endurance Book #20-A Jul 22 1908"

21A	08-11-04	"500 A to"; "900 A"; "All Cells in this Book are A"; "Hot Endurance Book #21-A Nov 4-1908"
22A	09-01-22.1	"900A"; "1299A"; "All cells in this Book are A"; "Hot Endurance Book #22-A Jan. 22, 1909"
23A	09-05-05.2	"1300"; "1749"; "All cells in this Book are A"; "Hot Endurance Book #23-A May 5-1909"
24A	09-07-02.2	"1750"; "1999"; "All cells in this Book are A"; "Hot Endurance Book #24-A Jul 2-1909"
25A	09-08-24	"2000"; "2399"; "All cells in this Book are A"; "Hot Endurance Book #25-A Aug 24 1909"
26A	09-10-22	"2400"; "2799"; "All cells in this Book are A"; "Hot Endurance Book #26-A"
27A	09-12-14	"2800"; "3169"; "All cells in this book are A"; "Hot Endurance Book #27A"
28A	10-01-31	"3170"; "3574"; "All cells in this book are A"; "Hot Endurance Book #28A"
29A	10-03-26	"3575"; "3953"; "Hot Endurance Book #29 A"
30A	10-04-26.1	"3954"; "4326"; "Hot Endurance Book #30 A"
31A	10-05-28	"4327"; "4697"; "All cells in this Book are A"; "Endurance Book Short Tubes #31A"
32A	10-06-28	"4698"; "5049"; "Endurance Book Short Tubes #32A"
33A	10-08-04	"5050-"; "5433"; "All cells in this Book are A"; "Endurance Book Short-Tubes #33A"
34A	10-09-12.1	"5434-"; "5799"; "All cells in this Book are series A"; "Endurance Book Short-Tubes #34A"
35A	10-11-12	"5800"; "6176"; "All cells in this Book are series A"; "Endurance-Book Short-Tubes #35A"
36A	11-01-12	"6177"; "6580"; "All cells in this Book are Series A"; "Endurance-Book Short-Tubes #36A"
37A	11-03-17.1	"6581"; "6949"; "Record Short-Tubes #37A"
38A	11-05-03.1	"6950"; "7327"; "A"; "Record - Short Tubes #38A"
39A	11-06-09	"7328"; "7763"; "A"; "Record Short Tubes #39A"
40A	11-07-28.1	"7764"; "8154"; "7764"; "Record Short Tubes #40A"
41A	11-09-11	"8155"; "8548"; "8155"; "Record Short Tubes #41A"
42A	11-11-08.1	"8549"; "8953"; "8549"; "Record Short Tubes #42A"
43A	12-02-16.1	"8954"; "9348"; "8954"; "Record Short Tubes #43A"
44A	12-04-09	"9349-"; "9749"; "Record Short Tubes #44A"
45A	12-06-25	"9750 10147"; "Record Short Tubes 45A"
46A	12-08-24	"10148 10545"; "Record Short Tubes 46A"
47A	12-10-29	"10546 10943"; "Record Short Tubes 47A"
48A	13-01-18	"Record Short Tubes 48A"
49A	13-08-25.1	"12752 13495"; "Record Short Tubes 49A"
50A	13-12-30.1	"13495"; "Record Short Tubes 50A"
1	09-11-13	"Tube test For Laboratory Conkling"; "From Nov 13, 1909 To May 6, 1910 10687 To 12552 Book #1"
2	10-05-06	"Tubes for Laboratory Book #2 From May 6, 1910 To March 8, 1911. 12553 to 14430"
3	11-05-08	"WN Archer Tubes 14431 to 16556 Laboratory March 8, 1911 to Oct. 24, 11 Book #3 W.N.A."
[4]	11-10-24	"16557--To--19897, 1/4" Laboratory Tubes, From. Oct. 24 1911, To April 19th 1913"

[5]	13-04-21	"1/4 Inch Tubes for Laboratory Test. From April - 21 - 13. To July - 30- 15"; "from Tube Number 19898 To 23778"
[6]	15-08-02	"1/4 Inch Laboratory Tubes Aug 1915"; "1/4 inch Laboratory Tubes 23779 to 27745 From. Aug 2. - 1915 To. May. 31.-1917"

TAE Reports: Not Selected

Book #	N-Number	Label on Front Cover
1	07-02-20	"T.A.E. Report Feb 20-07 to May 25-07 #1 G.H.H.Jr."
2	07-05-22.2	"T.A.E. Report May 22-07 to Sep 10-07 #2 G.H.H.Jr."; "T.A.E. Report Tubes 2"
3	07-09-10	"T.A.E. Report Sep 10-07 to Nov 8-07 #3 G.H.H.Jr."; "T.A.E. Report Sep 10 1907 #3"
4	07-11-02	"T.A.E. Report Nov 2-07 to Dec 15-08 #4 G.H.H.Jr."; "T.A.E. Report 4"; "Long Tubes"
5	07-11-07.2	"T.A.E. Report Nov 7-07 to #5 G.H.H.Jr."
6	08-01-31	"T.A.E. Report Jan 31 1908 #6 G.H.H.Jr."; "Short Tubes and Irons"
7	08-04-25	"T.A.E. Report #7 G.H.H.Jr."; "Short Tubes Apr 25 1908"
8	08-09-10.1	"T.A.E. Report #8 G.H.H.Jr."; "Short Tubes Sep 10 1908"
9	09-01-08	"T.A.E. Report #9 G.H.H.Jr."; "Jan 8-1909 Long Tubes & Fes"; "Long Tubes & Fes"
10	09-03-15	"T.A.E. Report #10 G.H.H.Jr."; "Short Tubes Mar 15 1909"
11	09-08-23	"T.A.E. Report #11 G.H.H.Jr."; "Short Tubes Aug 13 1909"
12	10-01-10	"T.A.E. Report #12"; "Short Tubes Jan 10 1910"
13	10-06-20.1	"Not very Important"; "Report-Book #13 Long-Tubes & Fes 6/21/10-"
14	10-07-14.2	"T.A.E. Report Short-Tubes #14"
15	10-11-03.3	"2 T.A.E. Report Short-Tubes #15"
16	11-04-20	"T.A.E. Report Short-Tubes Vol #16"
17	11-09-13	"T.A.E. Report Short Tubes Vol #17"
18	12-03-26	"T.A.E. Report Short Tubes Vol #18"
19	12-12-26.1	"T.A.E. Report Short Tubes Vol 19 11-22-12"
20	13-06-28.1	"T.A.E. Report Short Tubes Vol 20"
21	14-02-16	"T.A.E. Report Short Tubes Vol 21"
22	14-07-27	"T.A.E. Report Short Tubes Vol 22"
	11-04-27.1	"T.A.E. Report Long Tubes & Fe's 4-27-11 Vol #14"
	12-03-15.1	"T.A.E. Report Long Tubes & Fe's 3-21-12 Vol #15"; "Somewhat Important"
	12-12-26	"T.A.E. Report 1/8 inch Tubes"
	13-01-07	"T.A.E. Report 1/4 inch Tubes Vol #16"
	13-01-29	"T.A.E. Fes. Hot Test Fes. Hot Test Long Tubes Temp. Test"
	14-05-16	"T.A.E. 3/16 Tubes Report"
	14-08-14.2	"T.A.E. Report, 1/4" (Duplicates) Tubes. Vol. I."
	14-09-11	"T.A.E. Report 1/4" inch Tubes Vol #17"

Goldstein Nickel Hydrate Books: Not Selected

N-Number	Label on Front Cover
09-05-05.1	"NiOH #1-72"
09-10-07.2	"Goldstein"; "73-169"
09-11-10	"Goldstein"; "Ni(OH)2 #170-#461"
10-03-08	"Goldstein"; "Ni(OH)2 #462-793"
11-07-10	"Goldstein"; "Ni(OH)2 794-913"
10-06-01.1	"Ni(OH)2"; "Goldstein"
11-08-11	"Ni(OH)2 806-945 Goldstein's Numbers"; "Experiments on Preparation of Ni(OH)2"; "Assisted by *[illegible]* Pearsall"

Notebook, N-05-01-03

05-01-03

Original cells in Sec. I. —

4060 A, B + C

D, E + F.

4061 A, B, C.

4110, 11, [illegible]

4197, 98, 99

4209, 11, 12

4264, 65, 66

4354, 55, 56

4355, 56, [illegible]

4285, 86, 87

4289, 90, 91

4294, 95, 96

4164, 65, 66

4419, 18, [illegible]

4419, 20, 21

4424, 25, 26

4458, 59, 61

4463, 64, 65

4465, 66, 70.

4482, 83, 84

4529, 30, 31,

4534, 35, 36.

4597, 98, 99.

4590, 91, 92.

4594, 95, 96

4601, 02, [illegible]

4624, 25, 27.

4631, 32, 33.

4634, 35, 39.

4660, 61, 62.

4665, 66, 67, 68.

4680, 81, 82.

4699, 99, 4700.

4722, 23, 24.

4733, 34.

4766, 67.

4775, 76, 77.

Also [illegible] 1-40 [illegible]

[illegible]

Section I.

Small Cell Endurance Test.

40 groups of 3 cells each.

Started January 3, 1905 at 3.00 A.M.

Off [illegible] @ .200 amp. on starting, then 4 hrs. during @ .100 amp.

I hour [illegible] 4 hrs. @ .200 amp. during 4 hrs. @ .100 amp.

Changes come at 4.00, 8.00, 12.00 A.M.

Must be looked at for first of first morning and tested for short circuits every morning.

Changes must be O.K'd by the day & night man, and test of short circuits repeated by the day man each day.

Any irregularities or deviations from the regular order of running must be recorded in this book.

1/3/05.

January 3, 1905.
Tests O.K. – W.E.H.
1 Changes O.K. – W.E.H.
1st run – 12 hrs. duty.

January 4.
Night changes O.K. – C.A.S.
4 Tests O.K. – A.K.
Day changes O.K – A.K.

January 5
Night changes O.K., C.A.S.
7 Tests O.K. – W.E.H.
Day changes O.K. except unit on duty 7 minutes late at 4.00 P.M. – W.E.H.

January 6
Night changes O.K. C.A.S.
10 Solution test O.K. – no S.C. Test – W.E.H.
Day changes O.K. – W.E.H.

January 7
Night changes O.K. C.A.S.
13 Tests O.K. – W.E.H.
Day changes OK. A.K.

January 8th 1905
Night changes O.K. C.A.S.
16 off charge 10 minutes – A.K.
Tests O.K. A.K.
Day changes OK A.K.

January 9th
Night changes O.K. C.A.S.
19 Tests O.K. A.K.
Day changes O.K. A.K.

January 10th
Night changes O.K. C.A.S.
22 Off charge 30 minutes 1.15 to 1.35 A.M.
Off N 740 A.K.
Tests OK – A.K.
Day changes OK A.K.

January 11th
Night changes O.K. C.A.S.
25 Tests O.K. A.K.
Day changes O.K. A.K. + A.K.

January 12
Night changes O.K. C.A.S.
28 Tests OK A.K.
Day changes OK A.K.

January 13th 1905
Night changes O.K. C.A.S.
31 Tests O.K. A.K.
Day changes O.K. A.K.
Off charge 10 min ABG

January 14 - 1905
Night changes O.K. C.A.S.
34 Off Discharge 10 Minutes to complete
Tests O.K. A.K.
Day changes O.K. A.K.

January 15
Night changes OK. C.A.S.
37 Tests O.K. A.K.
Day changes O.K. A.K.

January 16
Night changes O.K. C.A.S.
40 Tests OK A.K.
Day changes OK ABG A.K.

January 17
Night changes O.K. C.A.S.
43 Tests O.K. A.K.
Day changes O.K. A.K.

January 18
46 Night changes O.K. C.A.S.
Tests O.K. A.K.
Day changes O.K. A.K.

January 19
49 Night changes O.K. C.A.S.
Tests O.K. A.K.
Day changes O.K. A.K.

January 20-05
52. Night Changes O.K. C.A.S.
Tests OK A.K.
Day changes OK ABG A.K.

January 20th 1905
Off at midnight to stand until 4 o P.M. 1-21-05 for a regular charge and run on board with readings.
53

January 23rd 1905
Day Changes OK -
Tests OK -
Night Changes OK - C.A.S.
1½ hrs run 12 hrs chg -
Took off at 8.00 P.M. after one
12 hr. chg + 4 hr. disch. to run
again on board - W.E.H.

1 run ends

January 27, 1905.
On for 12 hr. chg. @ 4.00 P.M.
Tests O.K. - W.E.H.

January 28 -
Night Change OK. C.A.S.
Test OK W.L.P.
Day Changes OK W.L.P.

January 29
Night changes OK. C.A.S.
S.C. Test O.K. - W.E.H.
Day changes O.K. - W.E.H.

Av. charge 520 amp. Disch. - 408

January 30 - 1905
Night Changes OK. C.A.S.
S.C. Test O.K. - W.E.H.
Solution Test O.K. - W.L.P.
Day changes O.K. - W.L.P.

January 31 -
Night Changes OK - C.A.S.
Tests O.K. by Sotter - W.E.H.
Day changes O.K. - W.E.H.

February 1st - 05.
Night Changes OK. C.A.S.
Tests OK - ADC
Day Changes OK ADC

February 2nd
Night Changes OK. C.A.S.
Tests OK. Smith
Day changes O.K. Smith

February 3rd
Night changes OK. C.A.S.
Tests O.K. Smith
Day changes OK. Smith

Notebook, N-05-06-00

05·06·00

6/05

6/05

Form 49 9-4-1908 12 Books 50cpp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4719 190

Mix No. 770 A RA Spec Jr

Inspected by .....

Condition .....

Caliper as Received 65 - 80 - 85

Weight of Cake ..... grms.

Remarks. Changed KOH after 16th run

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		1666		20 hr @ 400	Run @ 700
2		1583		15 " "	" "
3		1757		15 " "	" "
4		1700		15 " "	500
5		1797		15 " "	" "
6		1808		15 " "	" "
7		SC		15 " "	200
8		1553		15 " "	" "
9		1661		15 " "	" "
10		1757		15 " "	" "
11		SC		15 " "	" "
12		SC		15 " "	500
13		1708		15 " "	" "
14		1750		15 " "	" "
15		SC		15 " "	200
16		1933	Changed	KOH 15 " "	" "
17		1800		15 " "	" "
18		1767		15 " "	" "
19		SC		15 " "	" "
20		1659		15 " "	500

Continued on page 3

Form 49 9-4-1908 12 Books 50cpp

EDISON STORAGE BATTERY COMPANY. 2

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4719 190

Mix No. 770 A RA Spec Jr

Inspected by .....

Condition .....

Caliper as Received 65 - 85 - 80

Weight of Cake ..... grms.

Remarks Changed KOH after 16th run

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1					
2		1667		20 hr @ 400	Run @ 200
3		1487		15 " "	" "
4		1753		15 " "	" "
5		1703		15 " "	" "
6		1773		15 " "	500
7		1770		15 " "	" "
8		1773		15 " "	" "
9		1733		15 " "	200
10		1667		15 " "	" "
11		1667		15 " "	" "
12		1600		15 " "	" "
13		1736		15 " "	" "
14		1717		15 " "	500
15		1700		15 " "	" "
16		1867		15 " "	" "
17		1500	Changed	KOH 15 " "	200
18		1747		15 " "	" "
19		1931		15 " "	" "
20		1673		15 " "	" "
		1808		15 " "	500

Continued on page 4

Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4218 190

Mix No. Continued from page 1

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake ..... grms.

Remarks Reassembled with new mix changed KOH and cycled 12 hrs after 74th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
21	2167	1633		15 hrs @ 400	Run @ 500
22	2135	1547		15 " "	" 500
23	2067	1533		15 " "	" 200
24	1983	1500	111-39	15 " "	" "
25	2100	1567			
26		50 Runs on Nat Endurance			Changed KOH
75	1943	967		15 hrs @ 400	Run @ 200
77	1933	1161		15 " "	" "
78		Reassembled with new mix			
79	2093	1360		15 hrs @ 400	Run @ 200
80	2060	1773		15 " "	" "
81	2030	1700		15 " "	" "
82	2035	1761		15 " "	" 500
83	2050	1495		15 " "	" "
84	1937	1400		15 " "	" "
85					
86					
87					
88					
89					
90					

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4219 190

Mix No. Continued

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake ..... grms.

Remarks Reassembled with new mix changed KOH and cycled 12 hrs after 74th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
21	2067	1642		15 hrs @ 400	Run @ 500
22	2033	1577		15 " "	" "
23	1987	1800		15 " "	" 200
24	1933	1763	105-93	15 " "	" "
25	1987	1717		15 " "	" "
26		50 Runs on Nat Endurance			Changed KOH
76	1900	1170		15 hrs @ 400	Run @ 200
77	1800	1175		15 " "	" "
78		Reassembled with new mix,			
79	2037	1853		15 hrs @ 400	Run @ 200
80	2047	1733		15 " "	" "
81	2013	1683		15 " "	" "
82	2008	1703		15 " "	" 500
83	2000	1347		15 " "	" "
84	1950	[illegible]		15 " "	" "
85					
86					
87					
88					
89					
90					

Form 49 9-4-1903 12 Books 800pp

9

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4221 190

Mix No. 270 B. Ra. Spec Jr.

Inspected by .....

Condition .....

Caliper as Received 6-5-34-30

Weight of Cake ..... grms.

Remarks Changed KOH after 10th run!

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		1613	6.5	20 hrs @ 400	Run @ 700
2		1373		15 " "	" "
3		1377		15 " "	" "
4		1170		15 " "	" 500
5		1167		15 " "	" "
6		1192		15 " "	" "
7		1167		15 " "	" 700
8		1147		15 " "	" "
9		1620		15 " "	" "
10		1637		15 " "	" "
11		1600		15 " "	" "
12		1800		15 " "	" 500
13		1167		15 " "	" "
14		1167		15 " "	" "
15		88		15 " "	" 700
16		88		15 " "	" "
17		1487		15 " "	" "
18		1167		15 " "	" "
19		1167		15 " "	" "
20		1383		15 " "	" 500

Continued on next page

Form 49 9-4-1903 12 Books 800pp

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4221 190

Mix No. Continued from page 9

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake ..... grms.

Remarks Reassembled with new Nic. changed KOH and run 12 hrs after 24th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
21	2075	1417		15 hrs @ 400	Run @ 500
22	2058	1367		15 " "	" "
23	2078	1733		15 " "	" 700
24	1967	1733	115-104	15 " "	" "
25	1770	1710		15 " "	" "
6		50	Runs on Not Endurance		Changed KOH
76	1194	973		15 hrs @ 400	Run @ 700
77	1191	1133		15 " "	" "
8		Reassembled with new nickels			
78	2047	1743		15 hrs @ 400	Run @ 700
79	2045	1673		15 " "	" "
80	2033	1680		15 " "	" "
81	1995	1192		15 " "	" 500
82	2000	1717		15 " "	" "
83	1958	1317		15 " "	" "
16					
17					
18					
19					
20					

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4369 June 5-05 190

Mix No. 310 R.A. Spec 7c

Inspected by

Condition

Caliper as Received 69-85-85

Weight of Cake grms.

Remarks Reassembled with new Mix changed KOH and reserve 12 hr by mistake after 17th run

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2.287	1.570	71-85	20 hrs @ 400	Run @ 200
2	1.790	1.387		15 " "	" "
3	1.960	1.333		15 " "	" "
4	1.867	1.100		15 " "	" 500
5	1.767	1.083		15 " "	" "
6	1.793	1.117		15 " "	" "
7	2.170	1.407		15 " "	" 200
8	1.967	1.310	76-87	15 " "	" "
9	2.033	1.400		15 " "	" "
10	1.833	1.400		15 " "	" "
11	2.067	1.400		15 " "	" "
12	1.917	1.379		15 " "	" 500
13	1.796	1.033		15 " "	" "
14	1.750	1.137		15 " "	" "
15	1.933	1.330		15 " "	" 200
16	1.951	1.350	80-88	15 " "	" "
17	1.933	1.310		15 " "	" "
18	1.910	1.310		15 " "	" "
19		50 Runs on Hot Endurance Changed KOH			
69	1.187	930		15 hrs @ 400	Run @ 200
70	1.081	1.003		15 " "	" "

Continued on page 15

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4370 June 5 1905

Mix No. 310 R.A. Spec 7c

Inspected by

Condition

Caliper as Received 69-84-85

Weight of Cake grms.

Remarks Reassembled with new Mix changed KOH and Rev. 17 hr after 17th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2.400	1.480	77-83	20 hrs @ 400	Run @ 200
2	2.057	1.393		15 " "	" "
3	2.083	1.400		15 " "	" "
4	1.747	1.083		15 " "	" 500
5	1.667	1.000		15 " "	" "
6	1.647	983		15 " "	" "
7	2.100	1.383		15 " "	" 200
8	1.993	1.310	78-84	15 " "	" "
9	2.033	1.383		15 " "	" "
10	2.000	1.400		15 " "	" "
11	2.093	1.437		15 " "	" "
12	1.750	1.150		15 " "	" 500
13	1.758	1.017		15 " "	" "
14	1.833	1.071		15 " "	" "
15	2.090	1.47		15 " "	" 200
16	867	500		15 " "	" "
17	1.070	533	82-85	15 " "	" "
18	1.913	1.273		15 " "	" "
19		50 Runs on Hot Endurance Changed KOH.			
69	1.057	813		15 hrs @ 400	Run @ 200
70	1.025	933		15 " "	" "

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4369 190

Mix No. Continued from page 13

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Mix.			
7/11	2013	1117		15 hrs @ 400	Run @ 200
7/12	1997	1630		15 " "	" "
7/13	1960	1467		15 " "	" "
7/14	1884	1158		15 " "	" 500
7/15	1833	1133		15 " "	" "
7/16	1833	1158		15 " "	" "
3					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Form 49 9-1-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4370 190

Mix No. Continued from page 14

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Mix			
7/11	1958	1056		15 hrs @ 400	Run @ 200
7/12	2044	1540		15 " "	" "
7/13	1973	1448		15 " "	" "
7/14	1870	1108		15 " "	" 500
7/15	1775	1067		15 " "	" "
7/16	1783	1133		15 " "	" "
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4373 June 5 1905

Mix No. 7311 A Rd Spec 72

Inspected by

Condition

Caliper as Received

Weight of Cake grms.

Remarks Reassembled with new Nia changed KOH and Rev. 12 hrs after 17th mm by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	1933	1387	71-84	20 hrs @ 400	Run @ 200
2	1367	1253		15 " "	" "
3	1760	1333		15 " "	" "
4	1667	1000		15 " "	" " 500
5	1500	917		15 " "	" "
6	1442	875		15 " "	" "
7	2063	1267		15 " "	" "
8	1997	1193	76-86	15 " "	" " 200
9	1967	1333		15 " "	" "
10	1933	1333		15 " "	" "
11	2020	1460		15 " "	" "
12	1850	950		15 " "	" "
13	1675	983		15 " "	" " 500
14	1896	1133		15 " "	" "
15	1993	1467		15 " "	" "
16	1867	1255		15 " "	" " 200
17	1870	1357	79-86	15 " "	" "
18	1857	1530		15 " "	" "
19		50 Runs on Hot Endurance Changed KOH			
69	1160	983		15 hrs @ 400	Run @ 200
70	1143	1117		15 " "	" "

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Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4374 June 6 1905

Mix No. 7311 A Spec 72

Inspected by

Condition

Caliper as Received

Weight of Cake grms.

Remarks Reassembled with new Nia, Changed KOH and Rev. 12 hrs after 17th mm by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2100	1440	77-87	20 hrs @ 400	Run @ 200
2	1500	1133		15 " "	" "
3	1667	1267		15 " "	" "
4	1733	1033		15 " "	" " 500
5	1577	933		15 " "	" "
6	1417	883		15 " "	" "
7	2053	1253		15 " "	" "
8	2000	1207	77-89	15 " "	" " 200
9	2053	1333		15 " "	" "
10	2189	1393		15 " "	" "
11	2207	1460		15 " "	" "
12	1929	1050		15 " "	" " 500
13	1733	1033		15 " "	" "
14	1946	1133		15 " "	" "
15	2197	1450		15 " "	" " 200
16	2035	1355		15 " "	" "
17	2063	1393	73-90	15 " "	" "
18	1997	1493		15 " "	" "
19		50 Runs on Hot Endurance Changed KOH			
69	1974	1133		15 hrs @ 400	Run @ 200
70	1081	933		15 " "	" "

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Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4373 .....

Mix No. Continued from page 19 190

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake .....grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new mix			
2					
71	2130	1368		15 hrs @ 400	Run @ 200
72	2074	1467		15 " "	" "
73	2038	1467		15 " "	" "
74	1917	1158		15 " "	" "
75	1850	1133		15 " "	" 500
76	1883	1200		15 " "	" "
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4374 .....

Mix No. Continued from page 20. 190

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake .....grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new mix			
2					
71	2033	1133		15 hrs @ 400	Run @ 200
72	1997	1533		15 " "	" "
73	1930	1440		15 " "	" "
74	1883	1158		15 " "	" "
75	1833	1103		15 " "	" 500
76	1829	1142		15 " "	" "
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Form 49 9-4-1908 12 Books 500pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4386 ..... June 5 1905

Mix No. 3AAA RA Spec 3c

Inspected by .....

Condition .....

Caliper as Received 67-84-84

Weight of Cake ..... grms.

Remarks. Reassembled with new trip. Changed KOH and new 17 hrs. after 168 hrs. by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	1793	1267	68-81	20 hrs @ 400	Run @ 200
2	1937	1260		15 " "	" "
3	2333	1533		15 " "	" "
4	1950	1167		15 " "	" 500
5	1800	1050		15 " "	" "
6	1837	1075		15 " "	" "
7	2260	1437		15 " "	" 200
8	2136	1400	74-84	15 " "	" "
9	2253	1467		15 " "	" "
10	2130	1467		15 " "	" "
11	2270	1467		15 " "	" "
12	1792	1058		15 " "	" 500
13	1793	917		15 " "	" "
14	1654	983		15 " "	" "
15	2173	1383		15 " "	" 200
16	2073	1383	81-86	15 " "	" "
17	1937	1267		15 " "	" "
18		50	Runs on Hot Endurance. Changed KOH		
68	1872	917		15 hrs @ 400	Run @ 200
69	1837	930		15 " "	" "
		Continued on next page			

Form 49 9-4-1908 12 Books 500pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4386 190

Mix No. Continued

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake ..... grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new trip			
2	1990	1108		15 hrs @ 400	Run @ 200
3	2267	1533		15 " "	" "
4	2267	1437		15 " "	" "
5	1867	1100		15 " "	" 500
6	1767	1075		15 " "	" "
7	1917	1200		15 " "	" "
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4401 June 6 1905

Mix No. 307-A RQ Spec 2c

Inspected by

Condition

Caliper as Received 69-85-93

Weight of Cake grms.

Remarks Reassembled with new Nis. Changed KOH. Run 17 hr after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2270	1467	71-83	20 hrs @ 400	Run @ 400
2	1800	1267		15 " "	" "
3	2000	1373		15 " "	" "
4	1925	1125		15 " "	" 500
5	1905	1142		15 " "	" "
6	1737	1083		15 " "	" "
7	2213	1575		15 " "	" 200
8	2210	1600	81-88	15 " "	" "
9	2190	1448		15 " "	" "
10	2110	1520		15 " "	" "
11	2267	1623		15 " "	" "
12	2050	1417		15 " "	" 500
13	1992	1183		15 " "	" "
14	2062	1235		15 " "	" "
15	2133	1607		15 " "	" 200
16	2115	1575	86-88	15 " "	" "
17	2140	1480		15 " "	" "
18		50 Runs on		Hot Endurance	Changed KOH
68	1153	920		15 hrs @ 400	Run @ 200
69	1113	1071		15 " "	" "

Continued on page 31

Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4402 June 6 1905

Mix No. 307-A RQ Spec 2c.

Inspected by

Condition

Caliper as Received 69-85-85

Weight of Cake grms.

Remarks Reassembled with new Nis. Changed KOH. Run 17 hrs after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2365	1487	70-84	20 hrs @ 400	Run @ 200
2	2260	1400		15 " "	" "
3	2133	1357		15 " "	" "
4	1633	975		15 " "	" 500
5	1745	1083		15 " "	" "
6	1797	1167		15 " "	" "
7	2270	1457		15 " "	" 200
8	2213	1533	80-88	15 " "	" "
9	2033	1313		15 " "	" "
10	2120	1467		15 " "	" "
11	2200	1537		15 " "	" "
12	1692	1033		15 " "	" 500
13	1750	1083		15 " "	" "
14	1892	1158		15 " "	" "
15	2100	1438		15 " "	" 200
16	2047	1461	84-90	15 " "	" "
17	2057	1400		15 " "	" "
18		50 Runs on		Hot Endurance	Changed KOH
68	1834	790		15 hrs @ 400	Run @ 200
69	968	897		15 " "	" "

Continued on page 32

Form 49 9-4-1908 12 Books 800pp

31

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4401 190

Mix No. Continued from Page 29

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Mix			
2/70	2060	1450		15 hrs @ 400	Run @ 200
3/71	2042	1532		15 "	" "
4/72	2000	1483		15 "	" "
5/73	1983	1375		15 "	" 500
6/74	1967	1325		15 "	" "
7/75	1979	1379		15 "	" "
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Form 49 9-4-1908 12 Books 800pp

32

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4402 190

Mix No. Continued from page 30

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Mix			
2/70	1893	1011		15 hrs @ 400	Run @ 200
3/71	2050	1589		15 "	" "
4/72	1983	1430		15 "	" "
5/73	1683	936		15 "	" 500
6/74	1653	967		15 "	" "
7/75	1683	1076		15 "	" "
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9/76					
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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4405 June 6 1905

Mix No. 7873 A R.A Spec 7c

Inspected by

Condition

Caliper as Received 7.0-8.5-8.5

Weight of Cake grms.

Remarks Reassembled with new Mix. changed KOH and Run 17 hrs. after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2172	1400	71-87	20 hrs @ 400	Run @ 200
2	96	96		15 " "	" "
3	2193	1467		15 " "	" "
4	2017	1347		15 " "	" 500
5	1858	1083		15 " "	" "
6	2175	1308		15 " "	" "
7	2273	1600		15 " "	" 200
8	2033	1587		15 " "	" "
9	2090	1570		15 " "	" "
10	2177	1633		15 " "	" "
11	2100	1457		15 " "	" "
12	2119	1567		15 " "	" 500
13	1642	1000		15 " "	" "
14	1867	1158		15 " "	" "
15	2092	1633		15 " "	" 200
16	2043	1490	91-87	15 " "	" "
17	2057	1457		15 " "	" "
18		50 Runs on Art. Endurance			Changed KOH
19	933	680		15 hrs @ 400	Run @ 200
20	881	833		15 " "	" "

Continued on page 37

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4406 June 6 1905

Mix No. 7873 A R.A Spec 7c

Inspected by

Condition

Caliper as Received 7.0-8.5-8.5

Weight of Cake grms.

Remarks Reassembled with new Mix. Changed KOH and Run 17 hrs. after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2040	1333	70-81	20 hrs @ 400	Run @ 200
2	96	96		15 " "	" "
3	96	96		15 " "	" "
4	1550	1017		15 " "	" 500
5	1650	1067		15 " "	" "
6	1750	1108		15 " "	" "
7	2167	1513		15 " "	" 200
8	2063	1667		15 " "	" "
9	2033	1563		15 " "	" "
10	2050	1630		15 " "	" "
11	2033	1507		15 " "	" "
12	2033	1867		15 " "	" 500
13	383	200		15 " "	" "
14	1517	958		15 " "	" "
15	2067	1600		15 " "	" 200
16	2053	1571	77-85	15 " "	" "
17	2033	1467		15 " "	" "
18		50 Runs on Art. Endurance			Changed KOH
19	987	690		15 hrs @ 400	Run @ 200
20	933	833		15 " "	" "

Continued on page 38

Form 49 9-4-1908 12 Books 800pp

37 EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 44.05 190

Mix No. Continued from page 35

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new mix			
2/28	1.873	.950		15 hrs @ 400	Run @ 700
3/1	2.100	1.600		15 " "	" "
3/5	2.034	1.500		15 " "	" "
3/6	1.873	1.150		15 " "	" 500
3/7	1.817	1.092		15 " "	" "
3/8	1.917	1.200		15 " "	" "
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Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY. 38

TESTING DEPT.

RECORD OF RESULTS.

Series No. 44.05 190

Mix No. Continued from page 36

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new mix			
2/28	2.063	1.337		15 hrs @ 400	Run @ 700
3/1	1.983	1.597		15 " "	" "
3/2	1.967	1.449		15 " "	" "
3/3	1.918	1.083		15 " "	" 500
3/4	1.817	1.073		15 " "	" "
3/5	1.817	1.134		15 " "	" "
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Form 49 9-4-1908 12 Books 500pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4410 June 6 1905

Mix No. 3.1.8.A. R.A. Spec 7c

Inspected by

Condition

Caliper as Received 67-83-86

Weight of Cake grms.

Remarks. Reassembled with new mix changed KOH and Run 17 hrs. after 15 min. by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2133	1467	70-80	20 hrs @ 400	Run @ 200
2	2180	1473		15 " "	" "
3	2053	1500		15 " "	" "
4	1833	1083		15 " "	" 500
5	1742	1058		15 " "	" "
6	1906	1150		15 " "	" "
7	2037	1473		15 " "	" 200
8	1963	1333	77-83	15 " "	" "
9	1833	1367		15 " "	" "
10	1920	1417		15 " "	" "
11	2057	1460		15 " "	" "
12	1667	967		15 " "	" 500
13	1717	1133		15 " "	" "
14	1817	1067		15 " "	" "
15	1960	1333		15 " "	" 200
16	1933	1373	82-83	15 " "	" "
17	1913	1493	0	15 " "	" "
18		50 Runs on Hot Endurance Changed KOH			
19	1800	720		15 hrs @ 400	Run @ 200
20	1800	873		15 " "	" "

Continued on next page.

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4410 190

Mix No. Continued

Inspected by

Condition

Caliper as Received

Weight of Cake grms.

Remarks

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Mix			
2	1933	1833		15 hrs @ 400	Run @ 200
3	98	98		15 " "	" "
4	98	98		15 " "	" "
5	1917	1717		15 " "	" 200
6	1893	1367		15 " "	" "
7	1854	1317		15 " "	" "
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Form 49 9-4-1908 12 Books 800pp

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4429 ..... June 7 1905

Mix No. 3066 ... RA Spec 7c

Inspected by .....

Condition .....

Caliper as Received 65-85-85

Weight of Cake ..... grms.

Remarks Reassembled with new nickel changed KOH Rev 12 hr after 16% run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2133	1367	70-37	70 hr @ 400	Run @ 700
2	2200	1600		15 " "	" "
3	2173	1467		15 " "	" "
4	1958	1167		15 " "	500
5	1958	1158		15 " "	" "
6	1967	1317		15 " "	" "
7	2117	1533		15 " "	700
8	2058	1533		15 " "	" "
9	2070	1530		15 " "	" "
10	2033	1467	78-95	15 " "	" "
11	2043	1520		15 " "	" "
12	1842	1117		15 " "	500
13	1708	1042		15 " "	" "
14	1908	1150		15 " "	" "
15	1962	1400		15 " "	700
16	1933	1440	91-96	15 " "	" "
17	1865	1467		15 " "	" "
18		50 Runs on Hot Endurance			Changed KOH
65	900	667		15 hr @ 400	Run @ 700
66	881	783		15 " "	" "

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4430 ..... June 7th 1905

Mix No. 3066 ... RA Spec 7c

Inspected by .....

Condition .....

Caliper as Received 67-84-84

Weight of Cake ..... grms.

Remarks Reassembled with new Nic Changed KOH Rev 12 hr after 14% run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	1967	1300	77-84	70 hr @ 400	Run @ 700
2	2033	1433		15 " "	" "
3	2050	1333		15 " "	" "
4	1535	917		15 " "	500
5	1500	833		15 " "	" "
6	1600	943		15 " "	" "
7	1930	1315		15 " "	700
8	2070	1367	78-85	15 " "	" "
9	1967	1267		15 " "	" "
10	1930	1302		15 " "	" "
11	2037	1437		15 " "	" "
12	1575	900		15 " "	500
13	1467	875		15 " "	" "
14	1533	954		15 " "	" "
15	2000	1320		15 " "	700
16	1987	1343	93-87	15 " "	" "
17	1900	1314		15 " "	" "
18		50 Runs on Hot Endurance			Changed KOH
68	917	850		15 Runs @ 400	Run @ 700
69	1028	860		15 hr "	" "

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4479 190

Mix No. Continued from page 45

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake ..... grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Pins			
2	1331	1008		15 hrs @ 400	Run @ 700
3	2043	1590		15 " "	" "
4	1960	1400		15 " "	" "
5	1758	1050		15 " "	" 800
6	1945	1703		15 " "	" "
7	1933	1708		15 " "	" "
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Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4430 190

Mix No. Continued from page 46

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake ..... grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with New Pins			
2	1933	1393		15 hrs @ 400	Run @ 700
3	1900	1333		15 " "	" "
4	1913	1367		15 " "	" "
5	1943	845		15 " "	" 800
6	1800	900		15 " "	" "
7	1579	950		15 " "	" "
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Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4433 ..... June 7 1905

Mix No. 3.3.0 A R A Spec 7c

Inspected by .....

Condition .....

Caliper as Received 66-85-85

Weight of Cake ..... grms.

Remarks Reassembled with new Nig changed KOH and Rev 17 hrs after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2.000	1.700	78-37	70 hrs @ 400	Run @ 700
2	2.257	1.400		15 " "	" "
3	2.061	1.313		15 " "	" "
4	1.780	1.075		15 " "	" 500
5	1.633	993		15 " "	" "
6	1.697	1.050		15 " "	" "
7	2.038	1.389		15 " "	" 700
8	1.967	1.333	76-33	15 " "	" "
9	1.933	1.297		15 " "	" "
10	1.860	1.261		15 " "	" "
11	1.953	1.340		15 " "	" "
12	1.517	900		15 " "	" 500
13	1.552	963		15 " "	" "
14	1.650	1.017		15 " "	" "
15	1.860	1.267		15 " "	" 700
16	1.903	1.267	80-35	15 " "	" "
17	1.697	1.177		15 " "	" "
18		50 Runs on Hot Endurance Changed KOH			
19	910	693		15 hrs @ 400	Run @ 700
20					
21	867	813		15 " "	" "

Continued on page 53

Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4434 ..... June 7 1905

Mix No. 3.3.0 A R A Spec 7c

Inspected by .....

Condition .....

Caliper as Received 66-85-85

Weight of Cake ..... grms.

Remarks Reassembled with new Nig changed KOH and Rev 17 hrs after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	1.973	1.767	68-81	70 hrs @ 400	Run @ 700
2	2.183	1.473		15 " "	" "
3	2.127	1.373		15 " "	" "
4	1.750	1.067		15 " "	" 500
5	1.697	993		15 " "	" "
6	1.743	1.079		15 " "	" "
7	2.165	1.453		15 " "	" 700
8	2.050	1.467	76-84	15 " "	" "
9	2.100	1.400		15 " "	" "
10	2.047	1.400		15 " "	" "
11	2.132	1.487		15 " "	" "
12	1.871	967		15 " "	" 500
13	1.742	1.103		15 " "	" "
14	1.967	1.225		15 " "	" "
15	2.042	1.417		15 " "	" 700
16	2.011	1.517	82-97	15 " "	" "
17	2.033	1.473		15 " "	" "
18		50 Runs on Hot Endurance Changed KOH			
19	1.023	910		15 hrs @ 400	Run @ 700
20					
21	1.090	993		15 " "	" "

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Form 49 9-4-1908 12 Books 300

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4433 190

Mix No. Continued from page 51

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Mix.			
70	1974	1760		15 hrs @ 400	Run @ 700
71	1933	1373		15 " "	" "
72	1917	1377		15 " "	" "
73	1583	911		15 " "	" 700
74	1650	918		15 " "	" "
75	1750	1067		15 " "	" "
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Form 49 9-4-1908 12 Books 300pp

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4434 190

Mix No. Continued from page 52

Inspected by.....

Condition.....

Caliper as Received.....

Weight of Cake.....grms.

Remarks.....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new Mix			
70	1973	1980		15 hrs @ 400	Run @ 700
71	2040	1573		15 " "	" "
72	1978	1483		15 " "	" "
73	1942	1158		15 " "	" 700
74	1900	1143		15 " "	" "
75	1900	1275		15 " "	" "
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Form 49 9-4-1908 12 Books 800p

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4437 ..... June 7 ..... 190 5

Mix No. 374 A ... R.A Spec 7₂

Inspected by .....

Condition .....

Caliper as Received 7.0 – 8.9 – 8.7

Weight of Cake ..... grms.

Remarks. Reassembled with new mix. Changed KOH and Rev. 17 hrs. after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2207	1533	77-86	20 hrs @ 400	Runs @ 700
2	2367	1473		15 " "	" "
3	2257	1400		15 " "	" "
4	1811	1862		15 " "	" 500
5	1717	983		15 " "	" "
6	1745	1102		15 " "	" "
7	2273	1467		15 " "	" 200
8	2170	1467		15 " "	" "
9	2167	1400		15 " "	" "
10	2110	1400		15 " "	" "
11	2193	1447		15 " "	" "
12	1625	933		15 " "	" 500
13	1967	958		15 " "	" "
14	1733	1042		15 " "	" "
15	1970	1362		15 " "	" 200
16	2108	1371	87-91	15 " "	" "
17	2033	1333		15 " "	" "
18		50		Runs on Hot Endurance	Changed KOH
19	910	753		15 hrs @ 400	Runs @ 700
20	905	843		15 " "	" "

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Form 49 9-4-1908 12 Books 800p

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4438 ..... June 7 ..... 190 5

Mix No. 374 A ... R.A Spec 7₂

Inspected by .....

Condition .....

Caliper as Received 7.0 – 8.9 – 8.9

Weight of Cake ..... grms.

Remarks. Reassembled with new mix. Changed KOH and Rev. 17 hrs. after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	2273	1833	75-88	20 hrs @ 400	Runs @ 700
2	2370	1640		15 " "	" "
3	2190	1520		15 " "	" "
4	2117	1300		15 " "	" 500
5	2104	1278		15 " "	" "
6	2083	1333		15 " "	" "
7	2113	1582		15 " "	" 200
8	2093	1600		15 " "	" "
9	2120	1520		15 " "	" "
10	2043	1503		15 " "	" "
11	2120	1577		15 " "	" "
12	2050	1333		15 " "	" 700
13	2087	1333		15 " "	" "
14	2067	1308		15 " "	" "
15	1972	1482		15 " "	" 200
16	1970	1518	85-90	15 " "	" "
17	1973	1333		15 " "	" "
18		56		Runs on Hot Endurance	Changed KOH
19	977	758		15 hrs @ 400	Runs @ 700
20	947	883		15 " "	" "

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EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4437 190

Mix No. 374 a RA Spec 7c

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake .....grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new nickels			
2	1820	927		15 hrs @ 400	Run @ 700
3	1987	1427		15 " "	" "
4	1930	1390		15 " "	" "
5	1583	908		15 " "	" 500
6	1617	942		15 " "	" "
7	1608	942		15 " "	" "
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Form 49 9-4-1908 12 Books 800pp

EDISON STORAGE BATTERY COMPANY. 60

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4438 190

Mix No. 374 a RA Spec 7c

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake .....grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new nickel			
2	1970	1467		15 hrs @ 400	Run @ 700
3	1940	1393		15 " "	" "
4	1939	1392		15 " "	" "
5	1917	1183		15 " "	" 500
6	1917	1232		15 " "	" "
7	1875	1250		15 " "	" "
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16					
17					
18					
19					
20					

Form 49 9-4-1908 12 Books 500pp

63 EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4441 ..... June 7 1905

Mix No. 3377 A RA Spec Fe

Inspected by .....

Condition .....

Caliper as Received 6.6-8.1-8.5

Weight of Cake ..... grms.

Remarks Reassembled with new Mix. Changed KOH and new 17 hrs. after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	1903	1700	71.82	20 hrs @ 400	Run @ 200
2	2033	1473		15 " "	" "
3	1967	1213		15 " "	" "
4	1400	917		15 " "	" 500
5	1750	793		15 " "	" "
6	1375	1000		15 " "	" "
7	2057	1333		15 " "	" 200
8	2003	1300		15 " "	" "
9	2013	1767		15 " "	" "
10	2103	1333		15 " "	" "
11	2257	1450		15 " "	" "
12	1500	917		15 " "	" 500
13	1400	875		15 " "	" "
14	1537	1008		15 " "	" "
15	2145	1290		15 " "	" 200
16	2165	1400	80-85	15 " "	" "
17	56	56		15 " "	" "
18		50	Runs on Hot Endurance	Changed KOH	
19	1900	370		15 hrs @ 400	Run @ 200
20	1832	973		15 " "	" "

Continued on page 65

Form 49 9-4-1908 12 Books 500pp

EDISON STORAGE BATTERY COMPANY. 64

TESTING DEPT.

RECORD OF RESULTS.

Series No. 4442 ..... June 7 1905

Mix No. 3377 A RA Spec Fe

Inspected by .....

Condition .....

Caliper as Received 6.7-8.0-8.9

Weight of Cake ..... grms.

Remarks Reassembled with new Mix. changed KOH and new 17 hrs. after 16th run by mistake

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1	1900	1767	69-79	20 hrs @ 400	Run @ 200
2	2153	1473		15 " "	" "
3	2140	1310		15 " "	" "
4	1692	1042		15 " "	" 500
5	1577	979		15 " "	" "
6	1717	1128		15 " "	" "
7	2117	1448		15 " "	" 200
8	2043	1467		15 " "	" "
9	2050	1400		15 " "	" "
10	1859	1400		15 " "	" "
11	2045	1440		15 " "	" "
12	1608	950		15 " "	" 500
13	1417	858		15 " "	" "
14	1567	967		15 " "	" "
15	2040	1333		15 " "	" 200
16	1947	1400	79-87	15 " "	" "
17	1853	1433		15 " "	" "
18		50	Runs on Endurance	Chart changed KOH	
19	370	533		15 hrs @ 400	Run @ 200
20	860	675		15 " "	" "

Continued on page 66

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4441 190

Mix No. Continued from page 65

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake .....grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new		Nis	
2a	1890	1071		15 hrs @ 400	Run @ 700
3	2043	1470		15 " "	" "
4	1993	1430		15 " "	" "
5a	1647	1008		15 " "	" 500
6	1561	1000		15 " "	" "
7a	1733	1076		15 " "	" "
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

EDISON STORAGE BATTERY COMPANY.

TESTING DEPT.
RECORD OF RESULTS.

Series No. 4447 190

Mix No. Continued from page 64.

Inspected by .....

Condition .....

Caliper as Received .....

Weight of Cake .....grms.

Remarks .....

RESULTS.

RUNS	TOTAL	TO 1 VOLT	TOTAL SWELL	CONDITION	REMARKS
1		Reassembled with new		Nis	
2					
3a	1843	1078		15 hrs @ 400	Run @ 700
4	2038	1533		15 " "	" "
5	1967	1433		15 " "	" "
6a	1747	1050		15 " "	" 500
7	1761	1067		15 " "	" "
8	1833	1150		15 " "	" "
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Notebook, N-05-06-13

Hot Endurance Test.

Secs. #2, 3, 4, + 5.

Each section is made so that any number of the little metal cells from one to fifty may be run on it.

Cells will be classed in the sections according to their total capacity as follows, –

Sec. #2 cells above 750 m-a-h.
" #3 " 600 – 750 "
" #4 " 450 – 600 "
" #5 " 300 – 450 "

Cells will charge 4 hrs. @ 300 m-a and discharge @ 150 for 4 hrs. or until the first cell in each section reaches 30 V. when they will be taken off discharge and let stand until it is time to go on chg again. The current will be regulated and the switches turned over by hand.

If any one cell in a section drops down much in advance of the others in that section it will be removed and put in the next lower section.

A reading is to be taken at the end of discharge once a day on each section as soon as the first cell reaches 30 V.

The temperature in the cells is to be kept as nearly as possible at 55° C. The solution must be kept to the proper height at all times.

W. E. H.

June 13, 1905.

The following cells were put on for a 12 hr chg @ 12.00 noon to-day.

Sec #2	Sec #3	Sec #4
9514	9723	9881
9496	22	80
9471	21	79
9470	20	78
9445	9497	77
9444		9352
9351		

Sub #2

June 16, 1905.

The following cells were changed 12 hrs and put on for the first hot run at 8.00 A.M.—

Sec #2	Sec #3	Sec #4
10296	9639	9635
95	38	
94	37	
93	36	
92	35½	
91		
9641		
40		

June 16, 1905.

Reading at end of 8.00 A.M. discharge

Sec #2		Sec #3		Sec #4		Sec #5
	10.38 A.M.		9.00 A.M.		10.07 A.M.	
9514	121	9723	127	9881	69	
9496	118	22	128	80	73	
9471	30	21	129	79	124	
70	89	20	132	78	77	
9445	119	9497	30	77	30	
44	124	9639	128	9635	125	
9351	Rw.	38	129			
10296	126	37	130			
95	126	36	130			
94	126	35½	130			
93	126					
92	127					
91	127					
9641	125					
40	125					

Transferred #9351 to Sec #3.

" #9497 " " #4.

June 16 1905

Reading at the end of 4:00 PM Discharge

Sec #2	Sec #3	6:46 PM	Sec #4	5:15 PM	Sec #5
9514	9723	30	9881	132	S.K.
9496	9722	85	9880	132	
9471	9721	80	9879	133	
9470	9720	86	9878	133	
9445	Same to Sec #4		9877	132	
9444	9639	134	9352	30	
Same to Sec #3	9638	136	9635	136	
10296	9637	136	9497	137	
10295	9636	136			
10294	9635½	135			
10293	9351	Run			
10292					
10291					
9641					
9640					

June 17. 1905

Reading at the end of 12:00 AM Discharge

Sec #2	2:35 AM	Sec #3	1:15 AM	Sec #4	2:30 AM	Sec #5
9514	122	9723	125	9881	78	
9496	125	9722	128	9880	84	
9471	110	9721	126	9879	130	
9470	112	9720	130	9878	130	
9445	Run			9877	74	
9444	126	9639	125	9352	Run	
—	—	9638	127	9635	126	
10296	87	9637	127	9497	128	
10295	89	9636	129			
10294	82	9635½	126			
10293	85	9351	S.C.			
10292	90					
10291	42					
9641	94					
9640	121					

June 17th 1905

Cell # 9251 was S.C. on the 4:00 am to 8:00 am charge. ABO

Reading at the end of the 8:00 am Discharge

Sec #2 10:40 AM		Sec #3 9:13 AM		Sec #4 10:19 AM		Sec #5
9514	123.5	9723	128	9881	74	S.K
9496	122.5	9722	131	9880	79	
9471	114	9721	128	9879	125	
9470	116.5	9720	131	9878	128	
[illegible]	78	—		9877	66	
9444	124.5	9639	127	9352	23	
		9638	129	9635	122	
[illegible]	83.5	9637	120	9497	126	
10293	84.5	9636	122			
10294	41	9635	126			
10295	74	9351	30			
10292	86					
10291	29					
9641	96.5					
9640	110					

June 17th 1905

Reading at the end of 4:00 P.M. Discharge

Sec #2 6:21 P.M.		Sec #3 6:22 P.M.		Sec #4 6:13 P.M.		Sec #5
9514	124.5	9723	87.5	9881	73	S.K
9496	123.5	9722	88	9880	78.5	
9471	118	9721	85	9879	128	
9470	119	9720	88	9878	128	
9445	120	—		9877	66	
9444	124.5	9639	122.5	9352	24	
—		9638	124	9635	124.5	
10296	84	9637	128	9497	126	
10295	84.5	9636	128.5			
10294	63	9635	120			
10293	70	9351	84			
10292	86					
10291	30.5					
9641	92					
9640	94					

Sec #2	Sec #3	Sec #4	Sec #5
June 18-05			
Reading at the end of the day			
Discharge	G.A.S.		
Sec 2 - 2.25 AM	Sec 3 - 2.05 AM	Sec 4 - 2.30 AM	
9514 128	9351 123	9881 148	
9496 126	9635½ 129	50 85	
9471 122	9636 130	79 130	
9470 122	9637 130	78 130	
9445 126	9638 126	72 40	
9444 127	9639 127	9352 16	
		9635 128	
10296 86	9720 40	9497 129	
10295 86	9721 31		
10294 40	9722 42		
10293 38	9723 Rev		
10292 90			
10291 31			
9641 100			
9640 76			

Sec # 2	Sec # 3	Sec # 4	Sec # 5
June 18-05			
Reading at end of 8 am. Discharge			
	J.W.S.		
Sect 2 10.04	Sect 3 9.40	Sect 4 - 8-40	
9514 126	9351 S.C.	9881 - 134	
9496 123	9635½ 126	9880 - 134	
9471 120	9636 129	9879 134	
9470 120	9637 129	9878 134.5	
9445 124.5	9638 125	9772 135	
9444 126	9339 127	9352 Rev	
		9635 133	
10296 84	9720 83	9497 133	
10295 82	9721 76		
10294 32	9722 87		
10293 32	9723 20		
10292 86			
10291 20			
9641 94			
9640 90			

June 18th

Reading at the end of the 4:00 P.M.

Discharge

Sec #2 6.01 P.M.		Sec #3 5.40 P.M.		Sec #4 5.53 P.M.	
9514	126	9351	123	9881	82
9496	122	9635½	126	9880	128
9471	121	9636	129	79	129
9420	124	9637	129	78	130
9445	125	9638	124	72	67
9444	126	9639	128	9352	130
—	—	—	—	9635	126
10296	86	9720	86	9497	126
10295	83	9721	71		
10294	77	9722	86		
10293	77	9723	30		
10292	116				
10291	28				
9641	124				
9640	92				

June 19.

Reading at the end of 12.00 M. Discharge

Sec #2	2.02 P.M.	Sec #3	1.40 A.M.	Sec #4	1.59 A.M.	Sec #5
9514	126	9351	126	9881	127	
9496	123½	9635½	127	9880	127	
9471	122	9636	129½	9879	129	
9420	123	9637	129	9878	129	
9445	126½	9638	128	9872	64½	
9444	127½	9639	128½	9352	126	
—	—	—	—	9635	127	
10296	87	9720	77	9497	125½	
10295	84	9721	87			
10294	74½	9722	80			
10293	60	9723	28			
10292	123½					
10291	27½					
9641	123					
9640	41					

June 19th

Sec #2		Sec #3		Sec #4		Sec #5	
Reading at the end of 8 A.M. Discharge							
Sec #2 9576 A		Sec #3 9.05 A.M.		Sec #4 9.55 A.M.		Sec #5	
9514	126	9723	124	9881	122		
9496	124	9722	126	9880	122		
9471	122	9721	125	9879	128		
9470	124	9720	127	9878	128		
9445	126	—		9877	92		
9444	127	9639	130	9352	22		
—		9638	129	9635	127		
10296	86	9637	130	9497	126		
10295	84	9636	128				
10294	30	9635½	129				
10293	38	9357	24				
10292	122						
10291	161						
9641	120						
9640	100						

Left standing 4 hours

Sec #2		Sec #3		Sec #4		S.K.
June 19						
Reading at end of 8 P.M. Discharge						
Sec #2 9444 P.M.		Sec #3 9368 P.M.		Sec #4 9449 P.M.		Sec #5 9.10 P.M.
9514	127	9723	74	9881	28	9351 Pour
9496	129	9722	83	9880	76	9352 491
9471	124	9721	25	9879	125	9877 109
9470	126	9720	81	9878	124	
9445	126	—		—		
9444	128	9639	129	—		
—	—	9638	129	9635	128	
10296	86	9637	130	9497	127	
10295	85	9636	129			
10294	96	9635½	129			
10293	76					
10292	88					
10291	26					
9641	91					
9640	90					

Transferred #9351 from Sec 3 to Sec 5
" " #9352 " " #4 " " #5
98.77

June 20th 1905

Reading at the end of 4:00 A.M. Discharge 8X

Sec #2 5.41 A.M.		Sec #3 5.26 A.M.		Sec #4 5.51 A.M.		Sec #5 5.56 A.M.	
9514	128	9723	84	9881	14	9351	83
9446	127	9722	86E	9880	73	9352	80
9471	125	9721	28	9879	65	9877	81E
9470	126	9720	82	9878	121		
9445	127	—	—	—	—		
9444	129	9639	128E	—	—		
—	—	9638	130	9635	128		
10296	89E	9637	130	9497	127		
10295	87E	9636	130				
10294	82E	9635½	139				
10293	83						
10292	126E						
10291	22						
9641	83						
9640	93						

Transferred "10291 to Sec #3.
" 9639 - 35½ to Sec #2.

June 20th '05

Reading at the end of 12 Noon Discharge

Sec #2 1.55 P.M.		Sec #3 1.29 P.M.		Sec #4 1.51 P.M.		Sec #5 2.11 P.M.	
9514	127	9723	88	9881	30	9351	86
9446	124	9722	88	9880	74	9352	30
9471	123	9721	30	9879	124	9877	36
9470	124	9720	88	9878	121		
9445	126	10291	90	—			
9444	128			—			
—	8[illegible]			9635	129		
10296	88			9497	127		
10295	86						
10294	21						
10293	22						
10292	90						
~~10291~~							
9641	91						
9640	90						
39	128						
38	128						
37	128						
36	128						
35½	121E						

Transferred "10296 - 10295 - 10294 - 10293 - 10292 to Sec #3
" 9635 - 9497 - Sec 2

June 20-05

Reading at end of 8 PM Discharge. SK

Sec #2	1016 PM	Sec #3	9.37 PM	Sec #4	9.03 PM	Sec #5	9.19 PM
9514	125	9723	24	9881	16	9351	27
9496	127	9722	14	9880	124	9352	125
9471	114	9721	26	9879	124	9877	125
9470	113	9720	21	9878	123		
9445	122	10296	89				
9444	123	10295	90				
—	—	10294	83				
9641	80	10293	83				
9640	36	10292	127				
9639	126	10291	89				
9638	127						
9637	127						
9636	127						
9635	125						
9635	105						
9497	124						

June 21st 05

Reading at the end of 4.00 a.m Discharge. S.K

Sec #2	5.14 a.m	Sec #3	5.19 a.m	Sec #4	5.07 a.m	Sec #5	5.03 a.m
9514	126	9722	18	9881	24	9351	27
9496	125	9722	15	9880	105	9352	126
9471	121	9721	12	9879	129	9877	112
9470	121	9720	93	9878	24		
9445	124	—	—				
9444	124	10296	129				
—	—	10295	129				
9641	29	10294	101				
9640	33	10293	122				
9639	127	10292	129				
9638	128	10291	128				
9637	128						
9636	128						
9635	126						
9635	109						
9497	126						

June 21 '05

Reading at the end of 12.00 Discharge

Sec #2 - 1.50 P.m.		Sec #3		1.26 P.m. Sec #4		1.45 P.m. Sec #5	
9514	127						
9496	127	9723	30	9881	30	9351	32
9478	128	9722	82	9880	76	9352	127
9470	128	9721	26	9879	128	9877	130
9445	126	9720	80	9878	128		
9444	128						
		10296	129				
9641	134	10295	129				
9640	132	10294	132				
9639	128	10293	129				
9638	128	10292	129				
9637	129	10291	128				
9636	129						
9635	127						
9635	126						
9487	126						

Disinjected 9641 - 9640 to Sec 3
" 9879 " 9878 to " 2

June 21-05

Reading at end of 8.00 P.m. Discharge

Sec #2		Sec #3		9.18 P.m.		Sec 4		8.40 P.m.		Sec 5		8.31 P.m.
9514	123	9723		92		9881		30		9351		132
9496	118	9722		85		9880		134		9352		50
9471	93	9721		50						9877		130
9470	88	9720		84								
9445	91	10296		130								
9444	125	10295		129								
9641	93	10294		127								
9878	81	10293		126								
9639	125	10292		130								
9638	126	10291		129								
9637	127	9641		129								
9636	127	9640		129								
9635	125											
9635	122											
9487	122											

June 22nd '05

Reading at the end of 4.00 a.m. Discharge

Sec#2	6.04 a.m.	Sec#3	5.28 a.m.	Sec#4	5.41 a.m.	Sec#5	5.46 a.m.
9514	123	9723	26	9881	30	9351	80
9496	126	9722	80	9880	123	9352	80
9471	127	9721	23			9877	76
9470	100	9720	75				
9445	Rev	10296	129				
9444	125	10295	129				
9879	59	10294	126				
9878	26	10293	127				
9639	125	10292	129				
9638	125	10291	126				
9637	127	9641	128				
9636	127	9640	128				
9635½	125						
9635	125						
9497	109						

June 22nd '05

Reading at the end of 1.00 p.m. Discharge

Sec#2	1.35 p.m.	Sec#3	1.27 p.m.	Sec#4	1.40 p.m.	Sec#5	1.45 p.m.
9514	128	9723	26	9881	30	9351	84
9496	126	9722	84	9880	96	9352	130
9471	128	9721	42			9877	60
9470	124	9720	30				
9445	128	10296	128				
9444	128	10295	129				
9879	120	10294	128				
9878	120	10293	128				
9639	129	10292	129				
9638	128	10291	126				
9637	129	9641	128				
9636	129	9640	128				
9635½	128						
9635	129						
9497	127						

Transferred #9445 to Sec. 8

June 22-05

Reading at the end of 8 AM Discharge

Sec #2 9.57 AM		Sec 3 9.18 AM		Sec 4 9.29 AM		Sec 5 9.27 AM	
9514	125	9723	22	9881	30	9351	28
9496	122	9722	42	9880	77	9352	88
9471	117	9721	24			9877	67
9470	117	9720	20				
9444	125	10296	127				
9879	64	10295	129				
9878	52	10294	127				
9639	124	10293	127				
9638	123	10292	129				
9637	126	10291	125				
9636	126	9641	127				
9635	125	9640	128				
9685	125	9445	126				
9497	24						

June 23-05

Reading at the end of 4.00 AM Discharge

Sec #2 5.51 AM		Sec #3 5.28 AM		Sec #4 5.21 AM		Sec #5 5.37 AM	
9514	126	9723	28	9881	79	9351	30
9496	123	9722	44	9880	78	9352	71
9471	124	9721	29			9877	64
9470	120	9720	24				
9444	126	10296	129				
9879	67	10295	128				
9878	65	10294	126				
9639	123	10293	126				
9638	127	10292	129				
9637	127	10291	124				
9636	127	9641	127				
9635	128	9640	129				
9685	125	9445	126				
9497	26						

June 22nd 05.

Read. on at the end of 12th Discharge

Sec 2		Sec 3		Sec 4		Sec 5	
136 Pm	115 Pm			127 Pm		137 Pm	
9514	128	9722	80	9881	30	9351	88
9496	127	9722	82	9880	74	9352	80
9471	126	9721	26			9877	60
9470	126	9720	Rem				
9444	128	10296	128				
9879	118	10295	128				
9878	119	10294	128				
9639	123	10293	127				
9638	108	10292	129				
9637	128	10291	127				
9636	128	9641	128				
9635	128	9640	128				
9635	128	9645	128				
9497	20						

Transferred 9723 " 9722 " 9721 " 9720 to Sec 4

" " 9351 " 9352 " 9877 to Sec 3

June 23rd 05

Reading at the end of 800 Pm Discharge

Sec 2		Sec 3		Sec 4		Sec 5
10.14 Pm		9.13 Pm		9.09 Pm		
9514	110	9351	54	9881	114	
9496	119	9352	123	9880	124	
9471	124	9877	120	9723	26	
9470	95	10296	127	9722	83	
9444	123	10295	129	9721	20	
9879	30	10294	128	9720	77	
9878	14	10293	127			
9639	74	10292	128			
9638	75	10291	86			
9637	124	9641	127			
9636	126	9640	128			
9635	124	9645	129			
9635	128					
9497	Rem					

June 24th "05

Reading at the end of 4 o'clock A.M.						Discharge
Sec#2	5094	Sec#3	5414	Sec#4	5132	Sec#5
9514	114	9351	85	9881	113	
9496	122	9352	64	9889	122	
9471	113	9277	54	9723	38	
9470	117	10296	120	9722	84	
9444	121	10295	120	9721	22	
9879	67	10294	122	9720	76	
9878	62	10293	82			
9639	27	10292	126			
9638	42	10291	30			
9637	125	9641	88			
9636	125	9640	89			
9635	124	9645	127			
9635	124					
9497	Rev					

June 24th "05

Reading at the end of 12 m.						Discharge			
Sec#2	1278	Sec#3	1328	Sec#4	1158	Sec#5	909		
9514	126	9351	84	9881	125	9277	73		
9496	128	9352	88	9880	129	9276	30		
9471	126	9277	116	9723	68	9275	116		
9470	128	10296	124	9722	84	8996	120		
9444	128	10295	122	9721	30	8995	127		
9879	122	10294	84	9720	35	8962	126		
9878	122	10293	82			8961	[illegible]		
9639	87	10292	127			8960	[illegible]		
9638	83	10291	30			8959	125		
9637	130	9641	88			8951	125		
9636	130	9640	88			8950	125		
9635	128	9645	128			8949	126		
9635	120					8948	128		
9497	Rev					8947	126		
						8916	124		
						8797	126		
						8796	128		
						8795	127		
				Sec #5		94	126		
				8635	128	93	126		
				8635	128	8634	126		
				8/2 55	125	33	128		
				54	124	32	125		
				53	126	8915	[illegible]		

Cl

One cells in Sec #5 on following page must be for a 12 hr. disch at 12:00 midnight June 23-24 1905. This is their first run on Indian creek.

Cell 8963 also discharge on this series but it was assembled hastily and almost entirely on the first change 8T on taking out the reports.

W.S.H.

June 24-05

Reading at the end of 800 P.M. Discharge

Sec #1		Sec #3		Sec #4		Sec #5
9298		9.21 A.M.		9.13 P.M.		10.13 P.M.
9514	116	9351	125	9881	122	9277
9496	122	9362	89	9880	130	9276
9471	119	9377	116	9723	22	9275
9470	128	10296	124	9722	84	8996
9444	124	10295	97	9721	84	8995
9879	68	10294	86	9720	88	—
9878	69	10293	84			8962
9639	29	10292	127			8961
9638	45	10291	20			8960
9637	124	9641	89			8959
9636	126	9640	89			8951
9635½	124	9445	129			8950
9635	126					8949
9497	Rev					8948
						8947
						8916
						8797
						8796
						8631
						8630
						8794
						8793
						8634
						8633
						8632

Sec #1 9497 has been cut out at the start of discharge in acct of Reverse

Sec #1 9497 was put back on end of

since 6/24/05 [illegible]

[illegible] on

Beginning Sec #5

8631	130
8630	129
8356	129
55	129
54	128
53	128

June 25th 05

Reading at the end of 400 A.M. Discharge

Sec #1		Sec #3		Sec #4		Sec #5
5.52 A.M.		5.16 A.M.		5.04 A.M.		5.58 A.M.
9514	112	9351	127	9881	127	9277	91
9496	125	9362	90	9880	130	9276	24
9471	122	9377	120	9723	30	9275	75
9470	128	10296	123	9722	83	8996	127
9444	75	10295	91	9721	81	8995	130
9879	80	10294	86	9720	81	—	
9878	76	10293	84			8962	127
9639	60	10292	128			8961	128
9638	126	10291	27			8960	128
9637	127	9641	90			8959	128
9636	128	9640	89			8951	128
9635½	129	9445	128			8950	128
9635	127					8949	129
						8948	128
						8947	128
						8916	127
						8797	129
				Sec #5		8796	129
				8631	130	8795	128
				8630	130	8794	127
				8356	129	8793	128
				8355	129	8634	127
				8354	128	8633	128
				8353	128	8632	127

June 25th 1905

Reading at the end of 12th Discharge

Sec#2 2.00 PM	Sec#3	12 PM	Sec#4 12.0 PM		Sec#5 2.00 PM	
9514	0	9351	125	9881	124	9277
9496	123	9352	88	9880	130	9276
9471	120	9877	114	9723	20	9275
9470	120	10296	114	9722	75	8996
9444	124	10295	88	9721	28	8995
9439	68	10294	84	9720	20	8962
9438	70	10293	82			8961
9639	Rev	10292	126			8960
9638		10291	8			8959
9637	124	9641	88			8951
9636	126	9640	88			8950
9635 1/2	125	9445	128			8949
9635	128					8948
						8947
						8916
						8797
						8796
				Sec#5		8795
				8630	128 5	8794
				8356	129 5	8793
				8355	127 5	8634
				8354	127 5	8633
				8353	127 5	8632
						8631

June 25th 1905

Reading at the end of 8th PM Discha

Sec#2 10.14 PM	Sec#3 9.46 PM	Sec#4 9.35 PM		Sec#5 10.49 PM	
9514	120	9351	126	9881	110
9496	123	9352	91 5	9880	129
9471	123 5	9877	116 5	9723	22
9470	124	10296	127 5	9722	81
9444	126	10295	128	9721	23
9439	70	10294	124	9720	27
9438	69	10293	85		
9639	70	10292	128		
9638	73	10291	20		
9637	126	9641	92		
9636	127 5	9640	91		
9635 1/2	127	9445	129		
9635	127 5				
				Sec#5	
				8630	129 5
				8356	129
				8355	129
				8354	128
				8353	127 5

9277	13
9276	Rev
9275	93
8996	127
8995	129
8962	128
8961	129
8960	129
8959	22
8951	120
8950	128
8949	126
8948	129
8947	129
8916	129
8797	127 5
8796	127
8795	128
8794	127 5
8793	125
8634	129
8633	127
8632	127 5
8631	129

June 26th 05

Reading at the end of 4 20 a.m. this change

Sec #2 5.49 AM		Sec #3 5.27 AM		Sec #4 5.17 AM		Sec #5 6.08 AM	
9824	124	9351	124	9882	164	9277	23
9496	122	9352	90	9880	129	9276	Rev
9471	122	9277	89	9723	46	9275	60
9470	118	10290	70	9722	78	9275	127
9469	123	10285	139	9721	44	9275	128
9379	67	10284	82	9720	18	9272	127
9358	68	10283	115			9261	126
9359	21	10282	126			9260	126
9358	41	10281	128			9259	125
9357	127	9641	102			9257	127
9636	127	9640	89			9256	126
9635	127	9640	27			9249	126
9635	128					9248	125
						9248	124
						9247	125
						9246	126
						9237	125
						9236	126
						9235	127
		Sec #5				9234	9.0
		8630	129			9233	128
		8556	128			8634	128
		8552	127			8633	127
		8554	126			8632	128
		8553	127			8631	129

June 26th 05

Reading at the end of 12 00 a.m. this change

Sec #2 1.46 PM		Sec #3 1.25 PM		Sec #4 1.13 PM		Sec #5 1.06 PM	
9824	124	9351	124	9881	123	9277	Rev
9496	124	9352	86	9880	130	[illegible]	[illegible]
9471	124	9277	114	9723	82	9275	Rev
9470	120	10285	127	9722	84	9275	Rev
9469	123	10285	126	9721	84	9275	125
9379	70	10284	90	9720	20	9272	124
9358	99	10283	80			9261	122
9359	28	10282	127			9261	117
9358	30	10281	24			9259	Rev
9357	127	9641	88			9257	111
9636	126	9640	88			9256	122
9635	127	9640	128			9249	126
9635	128					9248	126
						9247	126
						9246	120
						9237	98
						9236	80
						9235	82
						9234	Rev
						9233	108
						8634	122
						8633	126
						8632	126
						8631	127

Note. Cell #9236 was taken out here to repair

Sec. 34 missed 1 cum.

Zero cells #9243 and #9497 were repaired and put back on Tank at 1.00 P.M.

Sec #5

8630	126	9234	Rev
8556	128	9233	108
8555	128	8634	122
8554	124	8633	126
8553	124	8632	126
		8631	127

June 26-05

Readings Elec end of 8:00 PM Discharge

Sec #2 9:41 PM		Sec #3 9:20 PM		Sec #4 9:09 PM		Sec 5 10:18 PM	
9514	121	9352	85	9881	113	9277	276
9496	123	9361	86	9880	128	9276	127
9471	121	9877	128	9723	24	9275	127
9470	126	10296	127	9722	36	8995	127
9444	87	10295	103	9721	39	8995	127
9379	118	10294	81	9720	12	8963	126
9378	37	10293	78			8962	124
9639	24	10292	126			8961	118
9638	123	10291	28			8960	47
9637	124	9641	86			8959	126
9636	120	9640	85			8951	128
9635	127	9445	128			8950	127
9635	127					8949	127
9497	Rev					8948	125
						8947	127
dell 8:51 Blend taken						8916	118
off at 9 PM Discharge				Sec 5		8797	118
8351 missed 2 hours				8631	129	8796	83
				8630	127	8795	126
				8356	127	8794	80
				55	120	8793	127
				54	125	8634	110
				53	123	8633	127
						8632	127

June 27-05

Reading at the End of 4:00 PM Discharge

Sec #2 5:50 PM		Sec #3 5:30 PM		Sec #4 5:13 PM		Sec 5 6:17 PM	
9514	126	9352	87	9881	114	9277	130
9496	128	9361	—	9880	127	9276	85
9471	128	9877	129	9723	18	9275	[illegible]
9470	126	10296	126	9722	36	8995	128
9444	127	10295	85	9721	36	8995	128
9379	117	10294	80	9720	16	8963	128
9378	123	10293	77			8962	128
9639	12	10292	127			8961	70
9638	18	10291	28			8960	98
9637	124	9641	86			8959	129
9636	125	9640	85			8951	130
9635	127	9445	128			8950	129
9635	128					8949	127
9497	22					8948	128
						8947	127
						8916	118
						8797	128
				Sec 5		8796	84
				8631	129	8795	[illegible]
				8630	127	8794	[illegible]
				8356	127	8793	128
				8355	122	8634	110
				8354	125	8633	128
				8353	119	8632	127

June 27th 06. Reading at the end of 12 mo. Exchange

Secs 148 PM		Secs 1 AM		Secs 109 PM		Secs 2 1/4 PM	
9871	120	9882	89	9881	124	9277	50
9476	125	9861	126	9880	130	9276	53
9471	124	9877	127	9722	27	9275	78
9470	126	9296	126	9722	79	8996	130
9444	128	10295	56	9721	80	8995	130
9879	127	10294	82	9720	26	8962	128
9878	124	10293	76			8962	128
9889 3	Rev	10292	127			8961	54
9638 3	Rev	10291	18			8960	30
9637	125	9641	87			8959	128
9636	126	9640	86			8951	123
9635	128	9445	129			8950	120
9880	130					8949	128
9445	129					8948	126
						8947	126
						8946	119
						8797	126
						8796	86
						8795	129
						8794	503
						8793	130
						8634	128
						8633	130
						8632	129

Transferred "9639" "9638
" "9637 to Sec 3

Secs

Transferred "8996" "8995
" "8963" "8962" "8959" "8949
" "8948" "8947" "8797" "8795
" "8793" "8633" "8632" "8631
" "8630" "8356" "8355" to
Sec "2

Secs

8631	130		
8630	129		
8795	129		
8356	124		
8355	127		
8353	120		

Transferred "9880 to
Sec "2

HH

June 27-06 Reading at the end of sec Exchange

Sec "2 10 PM		Sec "3 9 1/2 PM		Sec "4 9 1/4 PM		Sec "5 10 1/4 PM	
9514	118	9352	91	9881	124	9277	121
9476	118	9351	0	9723	25	9276	114
9471	102	9877	128	9722	84	9275	75
9470	114	10296	127	9721	83	8961	94
9444	127	10295	83	9720	18	8960	31
9879	83	10294	79			8951	121
9878	60	10293	76			8950	112
9637	105	10292	127			8916	117
9636	68	10291	25			8796	86
9635	118	9641	85			8794	83
9635	124	9640	83			8634	104
9880	30	9445	Rev			8355	123
8996	128	9639	86			8353	120
8995	128	9638	85				
8963	128	9637	128				
8962	126						
8959	126						
8949	127	Sec "2					
8948	128	8632	127				
8947	125	8631	128				
8797	128	8630	129				
8795	128	8356	127				
8793	129	8354	127				
8633	129						

June 28th 1905 Reading at the E of 4:00 A.M. Discharge

Sec #2	5:30 A.M.	Sec #3	5:30 A.M.	Sec #1	5:30 A.M.	Sec #4	5:30 A.M.
9514	0	9352	93	9281	128	9277	76
9446	126	9351	93	9236	78	9236	72
9471	111	9377	129	9222	84	9275	74
9470	120	10296	118	9221	83	9261	102
9444	125	10285	82	9220	22	9260	49
9439	60	10284	78			8987	126
9438	64	10272	74			8980	106
9637	72	10273	128			8916	116
9636	20	10271	22			8796	86
9635	103	9611	85			8794	82
9633	28	9610	83			1634	118
9446	28	9445	127			1355	122
2996	130	9639	91			8353	122
2995	129	9638	85				
2993	129	9637	129				
2992	128						
2991	127						
2989	128	Sec #2	5:30 P.M.				
2988	126	9632	129				
2987	127	8631	130				
2987	129	8630	130				
2985	129	8356	129				
2983	130	8354	128				
2633	130						

June 28th 1905 Reading at the E of 12:00 Discharge

Sec #2	150 PM	Sec #3	112 PM	Sec #1	106 PM	Sec #4	200 PM
9514	0	9352	124	9281	128	9277	80
9446	122	9351	124	9222	64	9276	72
9471	116	9377	128	9223	84	9275	74
9470	120	10296	120	9221	81	9261	119
9444	0	10285	86	9220	26	8960	50
9439 3	60	10284	60			8987	122
9438	72	10283	70			8980	110
9637	76	10272	126			8916	118
9636	72	10271	20			8796	90
9635	74	9611	86			8794	82
9633	123	9610	84			8634	120
9446 3	44	9445	128			8355	123
2996	129	9639	128			8353	122
2995	130	9638	128				
2993	129	9637	129				
2992	128						
2989	127						
2988	128	Sec #2	150 PM				
2987	128	9632	130				
2987	130	8631	130				
2985	130	8630	130				
2983	130	8356	129				
2633	130	8354	128				

9514 SC and Turn out at the 1200 Discharge

Transferred "9879 "8880 to Sec #3

" 8961 "8951 "8950

"8916 "8634 "8355

"8353 to Sec #2

H.A.

June 25-05 Reading at the end of 500 Discharges

Sec # 2 9.51 PM		Sec # 3 9.18 PM		Sec # 4 9.08 PM		Sec # 5 9.02 PM	
9514	8.6	9352	90	9881	127	9277	30
9496	121	9351	8.6	9723	30	9276	72
9471	114	9877	128	9722	99	9275	74
9470	8.6	10296	86	9721	80	8960	86
9444	29	10295	81	9720	22	8796	90
9838	109	10294	76			8794	84
9637	43	10293	26				
9636	74	10292	125				
9635	109	10291	26				
9635	125	9641	134	Sec # 2 9.51 PM			
8996	128	9640	80	8856	128		
8995	128	9445	126	8854	128		
8963	8.6	9639	126	8961	128		
8962	128	9638	122	8951	129		
8957	129	9437	128	8950	128		
8949	128	9879	132	8916	128		
8948	128	9880	130	8634	125		
8947	129			8355	126		
8797	129			8353	100		
8795	129						
8793	129	Bells # 9470 # 8960		#9351 #9514			
8633	129	are left taken		off			
8632	128	at 9.14 PM 10 discharges.					
8631	129						
8630	128						

June 29th 05 Reading at the End of 400 Discharges

Sec # 2 5.04 PM		Sec # 3 5.09 PM		Sec # 4 5.11 PM		Sec # 5 5.01 PM	
9514	—	9352	120	9881	128	9277	30
9496	121	9351	—	9723	82	9276	53
9471	112	9877	129	9722	29	9275	73
9470	—	10296	85	9721	98	8960	78
9444	29	10295	80	9720	24	8796	90
9838	105	10294	75			8794	81
9637	40	10293	65				
9636	72	10292	125				
9635	104	10291	22				
9635	129	9641	84				
8996	128	9640	80				
8995	128	9445	125				
8963	—	9639	125	Sec # 2 5.11 PM			
8962	128	9638	125	8856	128		
8957	128	9437	127	8854	127		
8949	128	9879	131	8961	128		
8948	127	9880	131	8951	127		
8947	128			8950	125		
8797	129			8916	125		
8795	129			8634	121		
8793	129			8355	125		
8633	129			8353	104		
8632	128						
8631	129						
8630	129						

Sec 2 was off the 8.00 A.M. chg. 40 min. for an
" 3 " " " " " 40 " " "
count of a S.C. between the two lines.

June 24-25 Reading at the end of 100 Discharge											
Sec #1	212 P.M.	Sec #2	1.09 P.M.	Sec #3	10.57 A.M.	Sec #4	1.56 P.M.	Sec #2	9.44 A.M.	Sec #3	9.37 A.M.
9514	—	9552	4	9471	3.131	9277	30	9514	30	9477	129
9496	116	9551	4	9479	68	9276	72	9496	123	10222	125
9471	68	9377	130	9322	40	9270	74	9471	112	10291	30
9470	—	10295	4 86	9321	84	9260	82	9470	112	9445	128
9444	—	10295	4 82	9320	30	9296	89	9444	121	9639	129
9378	66	10295	4 76			9274	84	9378	118	9638	83
9637	30	10293	4 30					9637	80	9497	129
9636	70	10293	124	9445, 9444,	9353, 4			9636	77	9379	131
9635	76	10293	129	8.50	Taken off			9635	129	9881	8.6
9880	122	9641	4 85	to	upon S.C.	8.50	line	9880	130	10293	115
8996	127	9641	4 80	belong	on	N.S.H.		8996	130		
8995	128	9640	—					8995	131		
8983	—	9639	124	Sec #2	2.12 P.M.			8983	129		
8962	128	9638	128	8356	127			8962	131	Sec #2	9.44 A.M.
8957	126	9637	130	8354	128			8959	128	8856	130
8949	125	9379	134	8961	126			8949	130	8354	130
8948	126	9880	134	8951	[illegible]			8948	130	8961	131
8947	128			8950				8947	131	8951	130
8797	128			8916	126			8797	131	8950	130
8795	128			8634	120			8795	131	8916	130
8793	126			8355	128			8793	131	8634	128
8633	129			8353	82			8633	131	8885	129
8632	127	Transferred		9352 – 9354 –		10296		8632	131	8353	128
8631	128	" 10295 – 10294 – 10293 – 9641 – 9640 to						8631	130		
8630	128	Sec #4 Transferred 9881 to Sec #3						8630	131		

LA

June 30th Reading at the End of 4 o'clock Discharge

Sec 2	S.G.	Sec 3	S.G.	Sec 4	S.G.	Sec 5	S.G.
9514	130	9277	128	9272	98	9277	128
9486	122	10292	123	9272	86	9276	124
9471	117	10291	80	9271	81	9275	103
9470	116	9445	122	9270	80	9260	96
9449	113	9509	120	9352	127	8796	88
9438	113	9638 x	93	9351	128	8794	90
9637	78	9497	125	10296 x	128		
9636	76	9479	131	10295	124		
9635	127	9381		10294	81		
9628	128	9380	130	10293	80		
8996	127			9641	120		
8995	128			9640	90		
8963	128						
8962	130						
8959	123	Sec 2	S.G.				
8949	130	8966	130				
8948	128	8954	129				
8947	130	8961	130				
8797	130	8951	128				
8795	130	8960	129				
8793	130	8916	129				
8633	131	8634	128				
8632	130	8368	128				
8631	130	8353	123				
8630	131						

1st

June 30 / 05

Sections II III IV & V was not started on discharge until 1230 PM. on account of entering new cells to be discharged as follows

1906

Sec II	Sec III	Sec IV	Sec V
10379	9376 x	9475 x	9474 x
78	9373 x		9473 x
77	71 x		9374 x
76	9353 x		72 x
10324			9354 x
23			
22	Cells marked x have been running in glass tumblers on Sec 1 of Hot Endurance. They were taken apart and reassembled in metal cases (with finite R.O.) to run on these sections from now on. They have had 99 hot runs in the glass tumblers		
20			
19			
18			
17			
16			
15			
13			
9472 x	Other cells are new		
9375 x			

W.E.M.

June 30-05 Reading at the end of 1200 Discharge

Sec #2 2.16PM		Sec #2 2.11PM		Sec #3 1.48PM		Sec #3	
9514	20	8356	130	9877	129		
9496	122	8354	125	10292	124		
9471	120	8961	130	10291	30		
9470	116	8951	130	9445	126		
9444	119	8950	128	9639	128		
9878	115	8916	129	9638	—	S.C. from morning after	
9637	50	8634	125	9497	128		
9636	80	8355	125	9879	130		
9635	126	8353	122	9881	122		
9635	125	10379	132	9880	130		
8996	128	10378	128	9376	131		
8995	130	10377	131	9373	134		
8963	130	10376	132	9371	134		
8962	130	10324	131	9353	132		
8959	128	10323	131				
8949	130	10322	132	Cell #9638	Was SC and		
8948	130	10320	132	taken off	at the 1200		
8947	130	10319	131		discharge		
8797	125	10318	130		!!!		
8795	130	10317	131				
8793	130	10316	130				
8633	130	10315	130				
8632	130	10315	130				
8631	130	9472	130				
8630	130	9375	131				

June 30-05 Reading at the end of 1200 Discharge

Sec #4 1.34PM		Sec #4		Sec #5 2.35PM		Sec #5	
9723	76			9277	70		
9722	80			9276	68		
9721	80			9275	68		
9720	24			8960	122		
9352	125			8796	128		
9351	127			8794	80		
10296	127			9474	128		
10295	122			9473	0		
10294	76			9374	129		
10293	78			9372	126		
7641	86			9354	130		
9640	123						
9475		S.C. from morning after					

June 30, 1905.

At the end of the 12:00 noon discharge the cells numbers were put on Hot Test on June 13 and 14 were taken off to give regular runs on the board.

June 30th 05

Sec. 2 12:00 M		Sec. 3 12:00 M		Sec. 4 10:30 P.M.		Sec. 5 9:00 P.M.	
8996	128	9376	128	9475	30	9277	128
8995	128	9373	128			9276	110
8963	128	9371	127			9275	121
8962	129	9353	123			8960	129
8957	129					8996	129
8947	127					8994	126
8948	126					9474	125
8947	127					9473	120
8997	127					9374	128
8995	128	Sec. 6 9:00 P.M.				9372	126
8993	128	10377	129			9354	125
8633	129	10376	129				
8634	128	10324	130				
8631	128	10323	130				
8630	129	10322	130				
8356	128	10320	131				
8354	126	10319	129				
8951	126	10318	128				
8950	126	10317	130				
8916	126	10316	130				
8634	119	10315	129				
8355	128	10313	128				
8353	126	9472	125				
10378	129	9375	129				
10375	129						

July 1st 05

Sec. 6 6:00 P.M.		Reading at the end of 4th Sec. 4 6:27 A.M.		Sec. 5 6:49 A.M.	
8996	129	9376	92	9277	125
8995	129	9373	80	9276	75
8963	128	9371	122	9275	121
8962	130	9353	110	8960	130
8959	129			8996	130
8949	129			8994	130
8948	128			9474	124
8947	129			9473	27
8997	129			9374	118
8995	129			9372	126
8993	130	Sec. 2		9354	125
8633	129	10377	129		
8632	130	10376	129		
8631	130	10324	129		
8630	129	10323	129		
8356	127	10322	130		
8354	128	10320	129		
8951	127	10319	129		
8950	121	10318	128		
8916	128	10317	129		
8634	128	10316	129		
8355	130	10315	128		
8353	34	10313	128		
10378	129	9472	123		
10378	129	9375	129		

Notebook, N-05-08-24.1

August 24, 1908.

Endurance Test of "A" Type Cells.

Eighteen A4 cells, made regularly in S.B. factory, all contain —

#728 Ni(OH)$_2$
#24 Ni flake
#952 Fe Mix

Cells were filled with an electrolyte of 21 o/o KOH containing 11.4 grams of SiOH per liter, and given three or four regular runs in the Testing Department

Fresh electrolyte was then put in and cells were sent to the stock room where they stood for days.

They were then sent to the Laboratory where new solutions were added to cells to make the following electrolytes:

Electrolytes in which cells will be tested for endurance

See Note in Book

A4	#210	12 o/o KOH	saturated	with	SiOH	
	213	"	"	"	"	"
	211	15 o/o KOH	"	"	"	"
	214	"	"	"	"	"
	212	18 o/o KOH	"	"	"	"
	215	"	"	"	"	"
	216	21 o/o KOH + 15 g. SiOH per Cell				
	217	"	"	"	"	"
	218	"	"	30 g. SiOH		"
	219	"	"	"	"	"
	220	"	"	45 g. SiOH		"
	223	"	"	"	"	"
	224	"	"	60 g. SiOH		"
	225	"	"	"	"	"
	226	"	"	75 g. SiOH		"
	228	"	"	"	"	"
	229	24 o/o KOH + 45 g. SiOH per Cell				
	230	"	"	"	"	"

Dr. Grötke mixed solutions for cells #210 – 215, which, when added to the 333 cc of regular electrolyte con

tained in the pores of the plates, would make the required electrolyte in each cell. These electrolytes cannot be just right however, because the regular electrolyte which was removed from the cells varied in Sp. Gr. and also was not as strong as it should have been. It was:

On	*210	1.192	Sp. Gr.	at	20°C.
"	211	1.184	"	"	"
"	212	1.180	"	"	"
"	213	1.200	"	"	"
"	214	1.201	"	"	"
"	215	1.202	"	"	"

See note in Book

The 1000 cc of solution mixed by Dr. Grothe to add to each cell contains amounts of KOH and SiOH as follows:

For 12 % KOH saturated with SiOH — 70 g. KOH and 105 g. SiOH (850 cc 12.4 g SiOH).

For 15 % KOH saturated with SiOH — 140 g. KOH and 99 g. SiOH (800 cc 12.4 g SiOH).

For 18 % KOH saturated with SiOH — 214 g KOH and 94 g. SiOH (760 cc 12.4 g SiOH).

There was a slight excess of SiOH in each of these solutions (*210-215) as mixed.

The electrolytes for cells *218-228 were made up by adding dry SiOH (97 %) to fresh regular solution.

Fresh regular solution (21 % KOH + 11.4 g SiOH per liter) was put in cells *216-217.

1000 cc of 25 % KOH containing 41.2 g. of SiOH, was substituted for the same amount of regular solution in *229 and in *230 to make the required electrolyte.

*210-215 were given the 1st charge immediately after filling with the new electrolyte.

*216-230 stood 54 hrs. after filling, before putting on charge.

W.E.H.

A4 Cells #210 – 212.

DATE	TIME	MIN.	AMPS	VOLTS 210	VOLTS 211	VOLTS 212	TEMP. 210	TEMP. 211	TEMP. 212	REMARKS
				Charge #1						
8/20/09	A.M. 10.25	0	30	on charge						
8/21	A.M. 1.25	9.00	"	1.82	1.815	1.82	92.2	95	92.4	
				Discharge #1						
8/21	A.M. 1.28	—	open	1.507	1.522	1.502				
	1.30	0	30	1.48	1.477	1.479				
	.32	2	"	1.40	1.43	1.40				
	.35	5	"	1.365	1.367	1.372				
	.40	10	"	1.34	1.342	1.345				
	.50	20	"	1.307	1.317	1.32				
	2.00	30	"	1.28	1.28	1.282				
	.10	40	"	1.262	1.262	1.262				
	.30	60	"	1.242	1.243	1.247				
	.50	80	"	1.223	1.225	1.227				
	3.10	100	"	1.182	1.19	1.19				
	.30	120	"	1.16	1.165	1.165				
	.50	140	"	1.14	1.152	1.152				
	4.10	160	"	1.12	1.142	1.145				
	.30	180	"	1.10	1.12	1.125				
	.50	200	"	1.065	1.10	1.105				
	5.10	220	"	1.02	1.06	1.09				
	.20	230	"	1.019	1.057	1.065				
	.25	235	"	1.005	1.047	1.06				
	.27	237	"	1.00						-119.5

DATE	TIME	MIN.	AMPS	VOLTS 210	VOLTS 211	VOLTS 212	TEMP. 210	TEMP. 211	TEMP. 212	REMARKS
8/21/09	A.M. 5.30	240	30	.998	1.04	1.057				
	.40	250	"	.987	1.023	1.037				
	.50	260	"	.975	1.007	1.017				
	6.00	270	"	.957	1.00	1.00				-135
	.10	280	"	.92	.98	.98				
	.20	290	"	.87	.96	.962				
	.30	300	"	.815	.92	.945				
	.35	305	"	.76	.892	.932				
	.40	310	"	.58	.81	.90				
	.40½	310½	"	.50						
	.45	315	"		.75	.88				
	.50	320	"		.64	.837				
	.52	322	"		.50					
	.55	325	"			.75				
	7.00	330	"			.642				

A4 #210-212.

Date	Time	Min	Amps	Volts 210	Volts 211	Volts 212	Temperature 210	Temperature 211	Temperature 212	Temperature Table	Remarks
				Charge #2.							
8/21/08	a.m. 8.05	0	30	on charge			92.5	95	92	75	
	11.05	190	"				90	91	89.3	76.5	
	p.m. 2.05	300	"				92	92.2	91.2	79	
	5.05	540	"				97.7	95.5	97	82	
	8.05	720	"				98.2	100	98	81.7	
	11.05	900	"	1.84	1.825	1.837	94.7	96.3		78.3	
				Discharge #2.							
8/21	a.m. 11.05	—	open	1.59	1.575	1.577					
	11.10	0	30	1.50	1.497	1.497					
	.12	2	"	1.42	1.425	1.427					
	.15	5	"	1.382	1.355	1.353					
	.20	10	"	1.347	1.355	1.357					
	.30	20	"	1.32	1.32	1.32					
	.40	30	"	1.297	1.30	1.30					
	.50	40	"	1.29	1.292	1.292					
8/22	a.m. 12.10	60	"	1.252	1.26	1.25	93	95	93.2	77.3	
	.30	80	"	1.24	1.24	1.237					
	.50	100	"	1.21	1.217	1.215					
	1.10	120	"	1.197	1.20	1.20	92.2	94	92	77	
	.30	140	"	1.175	1.18	1.177					
	.50	160	"	1.155	1.162	1.16					
	2.10	180	"	1.137	1.145	1.143	93	94	92.5	77	
	.30	200	"	1.102	1.125	1.125					

Date	Time	Min.	Amps	Volts 210	Volts 211	Volts 212	Temp. 210	Temp. 211	Temp. 212	Temp. Table	Remarks
8/22/08	a.m. 2.50	220	20	1.08	1.105	1.105					
	3.10	240	"	1.05	1.083	1.087	94	95.7	94.3	77	
	.20	250	"	1.03	1.07	1.08					
	.30	260	"	1.02	1.06	1.062					
	.40	270	"	1.007	1.04	1.055					
	.45	275	"	1.002	1.037	1.042					
	.50	280	"	1.00	1.022	1.04					-140
	.55	285	"	.995	1.017	1.025					
	4.00	290	"	.99	1.00	1.012					-145
	.05	295	"	.947	.98	1.00					-147.5
	.10	300	"	.955	.965	.985	96	98.5	97.5	77.2	
	.20	310	"	.88	.88	.96					
	.23	313	"		.50						
	.25	315	"	.50		.975					
	.30	320	"			.84					
	.33	323	"			.635	100.7	103	97.7	77.2	

Stood 109 hours.
See third run of the entire list of Endhomed Cells on the 11th page following.

A4 #213-215.

Date	Time	Min.	Amps	Volts 213	Volts 214	Volts 215	Temp 213	Temp 214	Temp 215	Remarks
				Charge #1						
8/21/08	P.M. 2.25	0	30	on charge						
8/22	A.M. 5.05	990	"	1.80	1.80	1.80				
				Discharge #1						
8/22	A.M. 5.08	–	0 amp	1.67	1.67	1.665				
	5.10	0	30	1.48	1.48	1.48				
	.12	2	"	1.405	1.405	1.40				
	.15	5	"	1.38	1.38	1.38				
	.20	10	"	1.35	1.357	1.36				
	.30	20	"	1.30	1.31	1.32				
	.40	30	"	1.28	1.29	1.30				
	.50	40	"	1.26	1.265	1.275				
	6.10	60	"	1.225	1.24	1.24				
	.30	80	"	1.205	1.217	1.205				
	.50	100	"	1.18	1.192	1.18				
	7.10	120	"	1.16	1.17	1.17				
	.30	140	"	1.15	1.155	1.15				
	.50	160	"	1.13	1.14	1.13				
	8.10	180	"	1.097	1.095	1.092				
	.30	200	"	1.065	1.095	1.08				
	.50	220	"	1.035	1.065	1.042				
	9.10	240	"	1.005	1.03	1.005				
	.15	245	"	1.005	1.022	1.002				
	.17	247	"		1.00					-123.5

Date	Time	Min.	Amps	Volts 213	Volts 214	Volts 215	Temp 213	Temp 214	Temp 215	Remarks
8/22/08	A.M. 9.20	250	30	1.002	1.02	.997				
	.21	251	"	1.00						-125.5
	.25	255	"	.997	1.01	.99				
	.30	260	"	.997	1.01	.995				
	.35	265	"	.997	1.002	.992				
	.37	267	"		1.00					-133.5
	.40	270	"	.985	.997	.97				
	.45	275	"	.982	.99	.965				
	.50	280	"	.977	.98	.957				
	.55	285	"	.967	.977	.945				
	10.00	290	"	.96	.96	.937				
	.05	295	"	.947	.94	.92				
	.10	300	"	.92	.902	.895				
	.15	305	"	.87	.815	.837				
	.20	310	"	.81	.66	.837				
	.21	311	"		.50					
	.25	315	"	.55		.735				
	.26	316	"	.50						
	.30	320	"			.60				
	.32	322	"			.50				
				Stored over Sunday = 46 hrs.						

A4 *213-215.

DATE	TIME	MIN.	AMPS.	VOLTS 213	VOLTS 214	VOLTS 215	TEMP. 213	TEMP. 214	TEMP. 215	TEMP. Bdk	REMARKS
				Charge *2.							
8/24/08	A.M. 9.40	0	30	on chg.			76	76	76	75.7	
	11.40	180	"				82.2	82.5	86	75.8	
	P.M. 2.40	360	"				94.2	94.7	93.2	79	
	5.40	540	"				102.5	103	100.2	82.7	
	8.40	720	"				103.7	104	101	83	
	11.40	900	"	1.63	1.637	1.63	103	102.5	99	82.2	
				Discharge *2.							
8/24	P.M. 11.43	-	4 amp	1.562	1.552	1.552					
	11.45	0	30	1.47	1.462	1.47					
	.47	2	"	1.41	1.405	1.41					
	.50	5	"	1.38	1.38	1.362					
	.55	10	"	1.365	1.36	1.362					
8/25	A.M. 12.05	20	"	1.34	1.33	1.34					
	.15	30	"	1.315	1.31	1.315					
	.25	40	"	1.30	1.297	1.30					
	.45	60	"	1.266	1.26	1.265	100.5	100	97	81	
	1.05	80	"	1.24	1.237	1.24					
	.25	100	"	1.22	1.217	1.22					
	.45	120	"	1.202	1.197	1.20	100	99.7	95.5	80	
	2.05	140	"	1.18	1.175	1.18					
	.25	160	"	1.16	1.157	1.16					
	.45	180	"	1.14	1.137	1.14	99	98	94.5	79	
	3.05	200	"	1.12	1.115	1.12					

DATE	TIME	MIN.	AMPS.	VOLTS 213	VOLTS 214	VOLTS 215	TEMP. 213	TEMP. 214	TEMP. 215	TEMP. Bdk	REMARKS
8/25/08	A.M. 3.25	220	30	1.08	1.085	1.09					
	.45	240	"	1.05	1.06	1.06	99.7	99	95	79	
	4.05	260	"	1.03	1.037	1.03					
	.10	265	"	1.02	1.022	1.02					
	.25	280	"	1.015	1.015	1.013					
	.30	285	"	1.003	1.00	1.003					- 142.5
	.35	290	"	1.00		1.00					- 145
	.45	300	"	.982	.98	.99	102	101	97	75.5	
	5.05	320	"	.81	.845	.847					
	.08	323	"	.50							
	.09½	324½	"		.50						
	.15	330				.86					
	.25	340				.76					
	.30	345				.50			101.7		

Stood 36 hours.
See third run of the entire lot of Enduranced Cells on the 7th page following.

A4 #210 - 230.

DATE	TIME	MIN.	AMPS.	210	213	211	214	212	215	216	217	219	219	220	223	224	225	226	228	229	230	REMARKS.
										Charge #1												
8/24/09	5.25 p.m.	0	30			on	charge															
8/25	8.25 a.m.	900	-	—	—	—	—	—	—	1.81	1.802	1.80	1.81	1.80	1.805	1.805	1.80	1.795	1.795	1.795	1.797	
										Discharge #1												
8/25	8.28 a.m.	—	30							1.555	1.555	1.555	1.555	1.557	1.556	1.556	1.555	1.555	1.555	1.547	1.55	
	8.30	0	30		Cells #210 - 215 have					1.147	1.146	1.146	1.146	1.146	1.146	1.145	1.145	1.145	1.145	1.146	1.146	
	.32	2	"		Less		sun	on	the	heavy	1.395	1.39	1.39	1.395	1.395	1.395	1.395	1.39	1.39	1.39	1.395	
	.35	5	"		Before		the	rest	of	the	1.367	1.367	1.365	1.362	1.365	1.365	1.362	1.362	1.362	1.365	1.37	
	.40	10	"		Encouraged		Cells	were			1.35	1.347	1.345	1.342	1.342	1.342	1.342	1.342	1.34	1.342	1.35	
	.50	20	"		shaded.		They	are			1.315	1.317	1.315	1.305	1.312	1.315	1.31	1.305	1.307	1.307	1.317	
	9.00	30	"		more		shading	to			1.293	1.292	1.285	1.28	1.285	1.283	1.282	1.282	1.283	1.285	1.295	
	.10	40	"		allow		the	sun	to		1.27	1.27	1.265	1.26	1.26	1.26	1.26	1.262	1.26	1.267		
	.30	60	"		cover		up.				1.237	1.235	1.232	1.227	1.23	1.23	1.23	1.232	1.23	1.232		
	.50	80	"								1.215	1.212	1.21	1.205	1.21	1.205	1.207	1.205	1.205	1.21		
	10.10	100	"								1.195	1.192	1.19	1.182	1.185	1.185	1.187	1.187	1.182	1.187		
	.31	121	"								1.18	1.177	1.175	1.172	1.165	1.167	1.17	1.17	1.172	1.172	1.17	
	.50	140	"								1.17	1.165	1.162	1.157	1.152	1.157	1.16	1.157	1.16	1.16	1.16	
	11.10	160	"								1.15	1.147	1.147	1.142	1.135	1.14	1.145	1.15	1.15	1.15	1.15	
	.30	180	"								1.14	1.14	1.14	1.13	1.125	1.127	1.135	1.137	1.135	1.14	1.14	
	.50	200	"								1.135	1.135	1.135	1.122	1.122	1.122	1.127	1.13	1.13	1.135	1.13	1.13
	12.10	220	"								1.12	1.117	1.122	1.105	1.102	1.097	1.105	1.115	1.12	1.12	1.12	1.117
	.30	240	"								1.107	1.10	1.111	1.08	1.08	1.07	1.077	1.097	1.102	1.09	1.10	1.105
	.40	250	"								1.095	1.092	1.097	1.07	1.065	1.06	1.06	1.077	1.09	1.08	1.095	1.092
	.50	260	"								1.08	1.077	1.08	1.065	1.047	1.04	1.04	1.072	1.037	1.066	1.085	1.08

DATE	TIME	MIN.	AMPS.	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS.
8/25/08	1.00	270	30							1.07	1.062	1.072	1.035	1.036	1.03	1.03	1.055	1.062	1.052	1.072	1.072	
	.10	280	"							1.05	1.045	1.057	1.012	1.012	1.012	1.01	1.037	1.047	1.037	1.057	1.057	
	.16	286	"													100						- 143
	.17	287	"												1.00							- 143.5
	.17½	287½	"										1.00	100								- 143.7
	.20	290	"							1.03	1.03	1.04	.99	.99	.99	.99	1.017	1.027	1.012	1.04	1.035	
	.28½	298½	"														1.00		1.00			- 149.2
	.30	300	"							1.00	1.01	1.022	.97	.97	.972	.97	.997	1.005	.997	1.02	1.017	- 150
	.32	302	"															1.00				- 151
	.33	303	"								1.00											- 151.5
	.35	305	"																		1.00	- 152.5
	.37	307	"									1.00								1.00		- 153.5
	.40	310	"							.932	.972	.99	.92	.932	.941	.925	.96	.97	.97	.99	.985	
	.50	320	"							.66	.90	.952	.805	.817	.877	.82	.882	.90	.915	.952	.942	
	.52½	322½	"							.50												
	.58	328	"										.50									
	.58½	328½	"											50								
	2.00	330	"							—	.67	.817	—	—	.745	.45	50	.57	.772	.867	.835	
	.01	331	"															50				
	.02½	332½	"								.50											
	.03½	333½	"												50							
	.04	334	"																50			
	.06½	336½	"									.50										
	.07	337	"																	—	30	- 168.5
	.08	338	27																	66		
								Charge #2.														
8/25	P.M. 5.25	0	30	on charge																		
8/26	A.M. 8.25	900	"	—	—	—	—	—	—	1.80	1.810	1.802	1.80	1.80	1.80	1.802	1.797	1.797	1.797	1.797	1.80	
								Discharge #2														
8/26	A.M. 8.28	—	open							1.575	1.55	1.552	1.55	1.552	1.555	1.557	1.55	1.55	1.55	1.545	1.55	
	8.30	0	30							1.48	1.47	1.465	1.46	1.46	1.455	1.462	1.46	1.46	1.455	1.455	1.455	
	.32	2	"							1.395	1.39	1.39	1.39	1.392	1.385	1.397	1.397	1.397	1.395	1.395	1.397	
	.35	5	"							1.375	1.37	1.365	1.365	1.37	1.365	1.377	1.375	1.375	1.375	1.375	1.377	

DATE	TIME	MIN.	ANS	210	213	211	214	212	215	216	217	219	219	220	223	224	225	226	229	229	230	REMARKS.
8/26/08	8.40 AM	10	30							1355	1355	1352	1355	1355	1345	1336	1326	1357	1355	1355	1326	
	.50	20	"							1.22	1327	1325	1325	1325	1322	1333	1333	1325	1325	1322	1327	
	9.00	30	"							1.20	1.30	1.27	1.20	1.20	1.27	1.20	1.20	1.20	1.20	1.20	1.30	
	.10	40	"							1.28	1.28	1.25	1.28	1.28	1.22	1.28	1.28	1.28	1.27	1.25	1.27	
	30	60	"							1.25	1.25	1.25	1.25	1.25	1.245	1.25	1.25	1.25	1.25	1.245	1.25	
	50	80	"							1.23	1.232	1.23	1.232	1.227	1.227	1.227	1.225	1.227	1.22	1.225		
	10.10	100	"							1.222	1.22	1.217	1.212	1.212	1.207	1.21	1.21	1.207	1.205	1.205	1.21	
	.30	120	"							1.21	1.207	1.202	1.20	1.192	1.19	1.19	1.19	1.19	1.19	1.185	1.19	
	.50	140	"							1.192	1.192	1.185	1.185	1.177	1.17	1.177	1.177	1.177	1.175	1.172	1.175	
	11.10	160	"							1.177	1.177	1.172	1.17	1.167	1.16	1.16	1.16	1.16	1.162	1.162	1.165	
	.30	180	"							1.17	1.155	1.16	1.16	1.152	1.15	1.152	1.157	1.155	1.152	1.155	1.155	
	.50	200	"							1.155	1.152	1.15	1.15	1.142	1.137	1.137	1.14	1.142	1.137	1.14	1.142	
	12.10	220	"							1.14	1.137	1.137	1.132	1.125	1.12	1.122	1.13	1.13	1.12	1.125	1.127	
	.30	240	"							1.127	1.12	1.117	1.110	1.10	1.097	1.097	1.102	1.11	1.10	1.102	1.107	
	.50	260	"							1.092	1.092	1.085	1.086	1.067	1.07	1.07	1.077	1.082	1.077	1.08	1.082	
	1.00	270	"							1.077	1.100	1.01	1.097	1.01	1.017	1.02	1.027	1.047	1.03	1.04	1.04	- 135
	.01	271	"									1.00										- 135.5
	.02	272	"											1.00								- 136.5
	.04	274	"												1.00							- 137
	.05	275	"							1.00						1.00	1.00					- 137.5
	.06	276	"																1.00			- 138
	.07	277	"																	1.00		- 138.5
	.08	278	"								50		50					1.00			1.00	- 138.7
	.09	279	"									50										
	.10	280	"							.76				.78	.885	.90	.85	.93	.925	.91	.90	
	.12½	282½	"							50				50								
	.13	283	"												.50		50				50	
	.14½	284½	"															50	50			- 143
	.15	285	"													55				50		
	.16	286	"																			
	.16½	286½	26																			

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
							Charge #3															
5/26/09	PM 5.25	0	20	75.5		76.		76		83		85.5		86		83.7		85.2		85		Temp. Reading
	8.25	150	"	86.2		87		88		90		92.5		93		91		92.2		92.2		" "
	11.25 AM	300	"	90.2		90.7		92		96		99		99		97.2		99		99.4		" "
5/27	2.25	540	"	94.2		96.7		99		100.		103		103		101.3		103		103		" "
	5.25	720	"	97.7		101.6		102.5		103.7		107		107.7		106.		107.5		107.7		" "
	8.25	900	"	97.5		101		102.		103.7		105.6		106.6		105.7		106		105.7		" "
	8.25	"	"	122.4	122.4	122	122	122.4	122.4	122.5		122.4	122.4	122.5	122	122	122	122.5	122.5	122.5		P.D. Reading
							Discharge #3															
			AM	158	158	157.5	157.5	157	156.5	156.5	156.5	154	154.5	154.5	155	155	156	155.5	156	156	155.5	
5/27	8.30	0	30	149	149	148	148	148	147	146	146	145.5	145	145.7	145.5	146	146	146	146	145.5	146	
	.32	2	"	141	141	141	141	141.5	140.7	141	140	140	140.7	140	140	140.5	140.7	141	140.5	140	141.5	
	.36	6	"	138	138	138	138	138	137.7	138	137.5	137.7	137.5	138	137.7	137.5	137.5	137.5	137.5	137.5	137.5	
	.40	10	"	136.2	136.5	136.5	137	137	136.5	136	137	136	136	136.7	136.7	137	137.5	136.7	136.5	136.5	137.5	
	.50	20	"	134.2	134.7	134.2	134.2	134.7	134.2	133.7	133.7	133.7	133.7	134	133.7	134.2	134.2	134.5	134.5	134	134	
	9.00	30	"	132.2	132	132	132	132.2	132	132	130.7	131	131.5	131.5	131.5	132	132	132	132	132	132	
	.10	40	"	130	130.2	130.2	130	130.5	130	129.5	129.5	129.5	129	129.7	129.5	130	130	130	130	129.7	129	
	.30	60	"	95.5		100.		101		99.7		102.5		103.7		100.2		102.5		102.7		Temp. Reading
	.30	60	"	127	127.7	127.7	127.5	128.5	127.5	127	126.2	126.2	126.2	126	126	127	127	127	127	126.2	126.5	P.D. Reading
	.50	80	"	124.5	125.2	125.5	125.2	125.2	125	124.5	124.2	124	124	124	123.7	124.2	124.5	124.5	124	123.7	124	
	10.10	100	"	122	123.2	123.2	123.2	123.2	123.2	123	122.7	122.2	122	121.7	121.5	122	122	122	122	121.7	121.7	
	.30	120	"	96		100.		100.2		99		99		100		96.5		96.5		99.5		Temp. Reading
	.30	120	"	120.7	121.2	120.5	121	121	120.7	121.2	121.2	120.7	120.5	120.5	119.7	120.2	120.2	120.2	120	119.2	120.2	P.D. Reading
	.50	140	"	118	119.7	119.7	120	120	119.2	120.7	120.7	119.2	119.2	119	118	119	119	119	119	118	118.7	

DATE	TIME	MIN	AMP	210	212	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
8/27/08	A.M. 11.10	160	20	115	118	1182	1183	1182	1177	1172	1172	1187	118	1175	1172	1172	1177	1172	1172	117	1175	
	30	180	"	96		997		100		982		101		1005		98		972		97.5		Temp Reading
	40	180	"	1127	116	1162	1165	1164	1157	1177	1177	1172	117	1165	1157	116	1162	1162	1162	1157	1172	B.D. Reading
	50	200	"	1112	114	1142	1115	1147	114	117	117	1165	116	1152	1147	115	1152	1152	115	1147	1152	
	P.M. 1210	220	"	1087	1127	1125	1132	1122	1117	116	1155	1152	1147	1142	1132	1135	1147	114	1135	1135	1137	
	30	240	"	977		1007		1005		992		101		98		972		97		977		Temp Reading
	40	240	"	106	1102	1105	1112	1112	1097	1145	114	114	1122	1127	1117	112	1122	112	112	112	1155	B.D. Reading
	50	260	"	1152	118	109	1095	1095	1077	1125	1115	112	112	1107	1105	1102	112	111	1102	1102	1112	
	1.00	270	"	104	1092	1.077	1085	1.095	1.07	1.11	1.092	1.102	1.092	1.092	1.09	1.092	1.102	1.10	1.092	1.10	1.105	
	.10	280	"	1.032	1.06	1.067	1.07	1.07	1.052	1.07	1.100	1.052	1.052	1.077	1.072	1.085	1.09	1.092	1.092	1.09	1.095	= 140
	.14	284	"									1.00	1.00									= 142
	.15	285	"							1.00			1.00									= 142.5
	.15½	285½	"																			= 142.7
	.18	288	"									.50	.50									
	.20	290	"																			
	.20½	290½	"							50												
	.21	291	"	1.022	1.05	1.067	1.067	1.062	1.045					1.032	1.022	1.037	1.077	1.067	1.072	1.075	1.062	
	.24½	294½	"											1.00								= 147.2
	.25½	295½	"												1.00							= 147.7
	.30	300	"	1.017	1.04	1.05	1.052	1.052	1.04					.995	.979	1.04	1.037	1.062	1.042	1.037	1.055	
	.30½	300½	"											.50								
	.31	301	"												.50							
	.34½	304½	"														1.00					= 152.2
	.35	305	"																			= 152.5
	.36	306	"																1.00	.999		= 153
	.37	307	"																			= 153.5
	.37½	307½	"													1.00						
	.40	310	"	1.01	1.032	1.04	1.04	1.045	1.037												1.00	= 153.7
	.44	314	"	1.00												.995	.48	1.017	.991	.65	.9722	
	.44½	314½	"															1.00	.50			= 157
	.50	320	"	.955	1.01	1.02	1.017	1.02	1.02							.50					0	
	.55	325	"		1.00		1.00											50				
	.55½	325½	"			1.00																= 162.7
	2.00	330	"	.996	.989	.998	.985	1.01	1.01													= 164.7
	.04	334	"					1.00	1.00													
	.10	340	"	.89	.932	.962	.972	.98	.982													= 167
	.20	350	"	.848	.52	.87	.56	.97	.972													

DATE	TIME	MIN.	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
8/27/08	2.24	.354	30			50																
	2.30	360	"					50	.792													
	.31	.321	74						.792													
								Change # 4.														
8/27/08	4.55 P.M.	0	30	90.5		92.5		93		92.5		89		89		87.7		88.5		89		Temp. Reading
	7.55	180	"	95.5		95.5		96.2		92.7		95		95.5		95		96.2		96		" "
	10.55 A.M.	360	"	97.7		97.7		96		96.2		98.5		99.		99.2		100		100.2		" "
8/28	1.55	540	"	98		100.2		101.		100.2		102		102		102.7		105		105		" "
	4.55	720	"	98		101.5		102.7		101		104		105		103		105.5		105.5		" "
	7.55	900	"	97		101		103		100.7		103.2		103		102		104.2		104		" "
	7.55	900	"	185	184.5	184	184	183	183.5	181	180.7	180.7	181	182	182	182.5	183	182	182	182	182	P.D. Reading
								Change # 4														
8/28	7.58 A.M.		open	162	160	159.5	159	156.5	156	157	156.5	157	157	158	157.7	158	157.7	158	158	157.5	158	
	8.00	0	30	150	150	149	149	146.5	146	146.5	146.5	146.5	146	146.5	146.2	147	146.5	147	147	146.2	146.7	
	.02	2	"	142	142	142	142	142	142.2	141.7	141.5	141.5	141	141.5	141.5	141.5	141.5	142	142	141.5	141.7	
	.05	5	"	136.5	136.5	136.5	136.5	136	139	136.5	136.5	136.2	136.2	136.5	136.5	139.2	139.5	139.5	139.7	139.5	139.5	
	.10	10	"	137	137.5	137.5	137.7	137.5	137	136.5	136.5	136.5	136.5	137	136.5	137.5	137.7	137.7	138	137.7	138	
	.20	20	"	134.5	134.5	134.5	135	135	135	134	134	134.2	134	134.2	134	134.5	134.7	135.2	135.2	134.5	134	
	.30	30	"	132	132.2	132.5	132.5	132.5	132.5	132	131.7	131.7	132	132	131.7	132.5	132.5	133.5	133.5	132.2	132.2	
	.40	40	"	130.5	130.5	130.7	131	130.7	130.5	129.7	129.7	129.7	129.7	130	129.7	130.2	130.5	130.7	131.2	130.2	130.2	
	9.00	60	"	95		99		100.2		99.7		103		102		99.7		102.5		102		Temp Reading
	.00	60	"	127.7	127.7	128	128.2	128	128	127.7	127.5	127.5	127.5	127.7	127.2	127.7	127.7	128	127.8	127.7	127.3	P. D. Reading
	.20	80	"	124.7	125.7	125.5	125.7	125.5	125.5	125.5	125.5	125.5	125.5	124.7	124.2	125.5	125.5	125.2	125.2	125.5	125.5	

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS
8/28/08	9.40	100	20	123	1235	1232	1235	1230	1232	1232	1232	123	123	123	1222	1227	123	1232	123	1222	123	
	10.00	120	"	121	1222	1217	1222	1217	1217	1222	1222	1215	1212	1212	1215	121	1212	1212	1215	121	1212	
	20	140	"	119	1222	120	1222	1222	120	121	1221	120	120	120	119	1195	1197	1197	1197	119	1192	
	40	160	"	1175	119	119	119	1187	1185	120	120	1192	119	1187	118	1185	1185	1187	1187	118	1182	
	11.00	180	"	9472		987		100		100		1022		1005		9972		997		995		Temp Reading
	11.00	180	"	1155	1172	117	1175	117	117	1182	1182	118	118	1175	1172	117	1172	1175	1172	117	1172	P D Reading
	20	200	"	114	1162	1162	1165	1162	116	1177	1175	1175	117	1162	116	116	1165	1167	116	116	1162	
	40	220	"	1122	115	115	1152	1152	1145	1167	117	117	116	1157	1152	115	1156	1157	1152	115	1156	
	12.00	240	"	96		995		100		100		1022		101		987		1002		100		Temp Reading
	20	260	"	1022	113	113	1125	1132	1127	1152	1152	115	1145	114	1137	1137	114	114	1137	1137	1142	P D Reading
	40	280	"	1062	1092	110	1102	110	1095	107	110	1125	113	1122	112	112	1127	113	112	112	113	
	44½	284½	"							100	50	1077	109	1102	110	1102	111	111	1105	112	1112	-140
	45½	285½	"									100	"									
	46½	286½	"																			-142.2
	49	289	"							50												-142.7
	50	290	"	1022	1022	109	1097	1092				50										
	53½	293½	"										100	1082	1082	109	1097	110	1095	1092	110	-145
1	00	300	"	98.5		102		103		103.5			50									
	1.00	300	"	104	1092	1097	1092	108	108			1052		103.7		100		1022		1025		Temp. Reading
	.03	303	"												1032	1037	107	1072	1077	107	1067	107
	.07	307	"												100	100						-151.5
	.07½	307½	"												.44	.50						
	.08½	308½	"																	100		-153.7
	.10	310	"	1022	1057	1062	107	1107	1072												100	-154.2
	.12	312	"												1022	100	1045	1032	102	1095	50	-155
	.12½	312½	"																150			
	.13½	313½	"																	50		
	.15	315	"													100		199				-156.7
	.16	316	"														50					
	.19	319	"															100				-158
	.20	320	"	1012	1042	1047	1052	1052	1106							150						
	.21½	321½	"															79				
	.23	323	"	100														150				
	.30	330	"	1077	1012	1012	1015	1022	1027													-161.5
	.33	333	"		100																	-166.5

DATE	TIME	MIN.	AMP.	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	REMARKS.
8/29/08	1.22½	332½	30			100	100															-166.7
	.35	335	"	.955	.955	.955	.957	100	1.03													-167.5
	.40	340	"	.90	.947	.937	.9173 .60	.957	1.02													
	.45	345	"						1.00													
	.46	346	"																			-173
	.46½	346½	"	.50																		
	.49	349	"		50	50																
	.49½	349½	"					.50	.95													
	.50	350	"						.978													
	.55	355	"						.94													
	2.00	360	"						.957													
				102.2		109		109.5														Temp.

Changed wiring to the memory cups so that when a cell is short-circuited out zero, it will not affect the volt readings of the adjacent cells. The readings preceding nines were some of them affected in this way.

Change #5

8/29/08	P.M. 4.00	0	30	95		98		98	93.5			95.2	95.2	94.7		94.5		95				Temp.
	7.00	180	"	96.5		98.2		98.5	96			97	98	97		98		97.2				
	10.00	360	"	95		95.7		97.7	98			.997	100	99		101		100				"
8/29	A.M. 1.00	540	"	98.5		101		102	101			103	103.2	102.5		104		104				"
	4.00	720	"	99		102		103	102			103	104	102.2		104.2		104				"
	7.00	900	"	99		101.4		102	101			102.5	103.5	102		103		102.5				"
	7.00	"	"	184	184	184.2	184.5	183	183	183	180.5	180.5	181	181.5	181.7	182	182	181.5	182	182	182.5	C.D. Reading

Discharge #5

DATE	TIME	MIN.	AMP.	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
8/29/68	7:02	—	0	159	158.5	158	158	158	158	156	158.7	156	156	156.5	156.5	156.7	156.5	157	157	156.5	156.7	
	7:05	0	20	150	152	149	149	148.5	148.5	147	146	146.5	146.5	147	147	147.5	147	147	147.5	147	147.5	
	.07	2	"	142	142	142	142	142	142	140.5	140.5	140.5	140.5	141	141	141.7	141.7	142	142.2	141.7	141.7	
	.10	5	"	139	139	139	139.5	139.5	140	138	138	138.5	138.5	139	139	139.7	139.7	139.5	139.5	139.5	139.5	
	.15	10	"	137.5	137.7	138	138	138	138	136.5	136.5	136.5	136.5	137	137	137.5	138	138	137.5	138	137	
	.20	15	"	136	135	135	135	135	136.5	135.5	135.7	136	136	136	136.2	136.5	136	135	135.2	136.5	136.5	
	.25	20	"	133.5	133	133	133	133.5	133.7	133.5	133.5	133.5	133.5	133.7	133.2	133.5	133	133	133	133	133.2	
	.30	25	"	131.5	131.5	131.5	131.5	131.5	131.7	131.7	131.7	131.7	131.7	131	131	130.5	130.5	131.2	131	130.2	130.2	
	.45	40	"	130.5	131.5	131.5	131.5	131.5	131.7	131.7	131.7	102.2	102		100			102		101		Temp Reading
	8:05	60	"	96		99		99.5		99		131.5	131.5	131.7	131.5	131.5	131.7	131.5	131.5	131.5	131.5	
	8:05	60	"	132.5	132.5	132.5	132.2	132.2	132.5	132.5	132.7	132.5	132.7	132.5	132.7	132.5	132.5	132.5	132.5	132.6	132.5	
	.35	80	"	132.7	132.5	132.5	132.2	132.2	132.5	132.5	132.5	132.2	132.2	132.5	132.5	132.5	132.5	132.5	132.5	132.5	132.5	
	.45	100	"	130.7	130.5	130.5	130.7	130.5	130.5	130.5	130.7	99.7	99.5		99.7		99.5		99.7		97.5	Temp Reading
	9:05	120	"	95		95.5		95.5		97		132.7	132.5	132.5	132.2	132.5	132.2	132.2	132.2	132.2	132.7	
	9:05	120	"	132	132.5	132.5	132.2	132.7	132	132.2	132.2	130.5	130.2	130.2	130.7	130.0	130.0	130.2	130.2	129.7	132.2	
	.25	140	"	130.2	131.7	131.7	131.7	131.7	131.7	130.7	131.7	119.2	119.2	119.2	119	119	119	119.5	119.2	119.7	119.2	
	.45	160	"	119.7	119.2	120.7	120.2	119.5	119.2	119.7	119.7	97.7		98.5		95.7		98.5		97		
	10:05	180	"	97.7		99		97.7		95.7		118.7	118.7	117.7	117.7	117.7	117.7	118.2	118.2	118	117.7	
	10:05	181	"	117	118.2	118.2	118.5	118.5	118.5	118.5	118.7	117.7	117	117	117	117	117	117.5	117	117.7	117.7	
	.25	200	"	115.7	117	117.2	117.2	117.2	117	117.5	117.7	116.5	116.5	116.7	116	116.2	116.2	116.5	116.2	116	116	
	.45	220	"	114.5	116	116	116.2	116	116	117	117	99.5		97.5		99		97.7				
	11:05	240	"	95		101		99.5		97.5		114.5	114.5	114.7	114.7	114.2	114.7	115	114.5	114.5	115	
	11:05	240	"	112.5	114.2	114.2	115	114.5	114.5	115	115.2	112	112.2	112.2	112.2	112.2	112.2	112.2	112.2	112.2	112.2	
	.25	260	"	111.2	112.2	112.2	112.7	112.5	112.2	112.2	112.2	110.7	110.7	110.7	110.7	110.7	110.7	110.7	110.7	110.7	110.7	
	.35	270	"	110	112	112.5	113	112.5	112.5	110.7	111											

DATE	TIME	MIN	AMPS	210	212	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
8/29/-8	1137½	277½	20																			
	43	275	"							1.00	1.20											-136.7
	41	276	"																			-137.5
	42½	277½	"								50	100										-138.7
	43	278	"																			
	44½	279½	"							.50		50										
	45	280	"	109	111	1115	112	1115	1115				1062	1102	1102	1112	111	112	1112	1112	1112	
	49	284	"										100									-142
	51½	287½	"										50									
	.55	290	"	106	1102	1105	111	1107	1107					1072	1077	1097	1095	111	110	1095	1097	
	12.102	297	"											1.00								-149.5
	.102½	297½	"											.50	1.00							-148.7
	.105	300	"												.50	107	106	1095	1097	1.06	1.0672	
	.105½	300½	"	1.0672	109	1097	1097	1097	1097													
	.105	300	"	98.2		101.7		101.7		103		105.5		102.5		99.5	1.00	102		100.5	1.00	Amp. Reading
	.111	306	"																			-153.7
	.112	307	"																	1.00		-153.5
	.115	310	"	1062	108	108	1085	1082	109							1.00	54	106	1052	58	50	-155
	.116	311	"														40			50		
	.118	312	"													50						
	.121	313½	"																100			-158.2
	.122	317	"															100				-158.5
	.125	320	"															50	50			
	.126	321	"	102	1052	1057	106	106	107													
	.128	322	"	100																		-164
	.130	323	"	987	1032	1037	1027	1025	106													-167.2
	.132	324½	"				100															-167.5
	.140	325	"			100																-167.7
	.140½	325½	"		100																	-168.2
	.145	340	"	977	107	1042	1097	1052	1037													
	149½	343½	"				50															
	.150	344	"	.50																		
	.151	346	"		.50		.50															
	.153	348	"																			
	.154	349	"	.50																		
	.155	350	"						1.00													-174.5
	1.02½	351½	"						.1997													
									.92													

Sunday — Calls

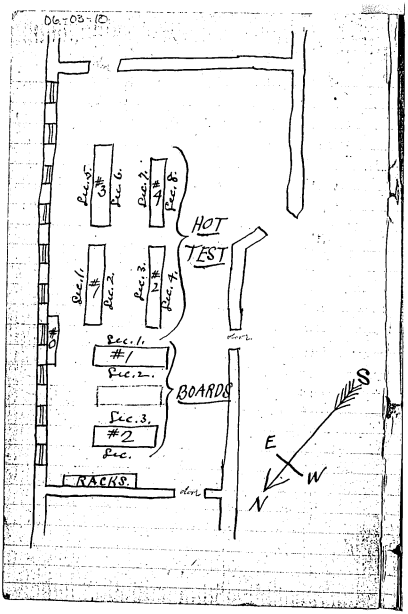
Stood Table 7.29 Hours.

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
						Charge #6																
8/30/08	PM 6.00	0	30	83.7		83.7		83.7		83.7		83.7		83.7		83.7		83.7		83.7		Temp
	9.00 AM	180	"	92		93		93.2		93		93		93.2		93		93		93		
8/31	12.00	360	"	95.5		96.2		97.2		98		99		99.4		99.5		99.7		99.6		
	3.00	540	"	99.6		100.4		102.2		104.9		104		103		102		102		102		
	6.00	720	"	99.2		100.9		101		100		100.2		102		101		101.5		100.2		
	9.00	900	"	100.9		102.6		104		102.2		102.4		104.5		102		104.7		103.2		
	9.00	"	"	182	182	182	182	182	181.7	179.4		179.2	178	180.2	180.2	180.2	181	180.2	180	178	179.1	
						Discharge #6																
8/31	AM 9.02	—	0/CM	152	152	152	152	152	152.5	152	152	152.2	152.2	152	152	152.2	152	152.2	152	152	152	
	.05	0	30	149	149	149.7	149.7	149.7	149.7	149	149.7	149	149	149	149	149.2	149.5	149	149.2	149.2	149	
	.09	2	"	149.2	149.2	149.2	149.2	149.2	149.7	149	149	149	149	149.5	149.7	149	149.2	149.2	149.2	149.2	149.2	
	.10	5	"	139	139	139	139	139	139	139	139.2	139	139	139.2	139	139	140	140	140	140	140	
	.12	10	"	137	137	137.2	137	137	137	137		137	137	137	137	137	137	137	137	137	137.5	
	.15	20	"	136	136	136	136	136	136.7	136	136.2	136	136	136.7	136.7	136	136	136	136	136	136.2	
	.25	30	"	133	133	133	133	133	133.5	131	131.2	133	131.7	132.7	132.2	133	133	133.7	133.5	133	133	
	.45	40	"	131.2	132	132	132	132	132	130.5	131.2	130	130	131	130.7	131.2	131.7	132	132	131.2	131.2	
	10.05	60	"	99		102.5		103		101		102.2		104		103		104.5		103.7		Temp
	10.05	60	"	128.7	129.2	129.2	129.7	129.7	129.7	127.5	127.7	127.5	127.5	128.5	128.5	128.5	129	129	129	128.5	128	
	.25	80	"	126.2	127	127	127	127	127	125.7	126.7	125.5	125.5	125.7	125.7	126	126	127	126.7	126	126	
	.45	100	"	124.5	125.7	125.7	125.5	125.7	125.7	124	124	124	124	124	124	124.7	124.7	125	125	124.2	124	
	11.05	120	"	99		102.2		102.5		102.2		104		105		102.7		105		104.2		Temp
	11.05	120	"	123	123.7	123.7	123.7	123.7	123.7	123	123	122.2	122.2	122.5	122.5	122.2	122.2	122.5	122.2	122.2	122.2	
	.25	140	"	122	122.2	122.2	122.2	122.2	122.5	121.7	121.7	121.5	121.7	121.7	121.7	121.7	122	122.2	122	121.7	121.7	
	.45	160	"	120.7	121	121	121	121	121.2	120.7	120.7	120.5	120.5	120.7	120.7	120.5	121	120.7	120	120	120	

DATE	TIME	MIN	AMPS	210	212	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
8/31/08	12:05	1:80	20	101		1045		105		103		106		1062		105		1045		104		Temp
	12:05	1:80	"	119	1202	120	120	120	120	1197	1197	1195	1195	119	119	1192	120	123	1192	119	1192	
	:25	200	"	1177	1187	119	119	119	119	1185	1185	1187	1185	1187	118	1182	1185	119	1185	1182	1185	
	:45	220	"	1167	1177	1177	1177	1177	1177	118	118	1182	1177	1175	1172	1175	1177	1182	1177	117	1175	
	1:05	240	"	1045		1065		107		1055		107		1075		1055		106		106		Temp
	:05	240	"	1157	1165	1165	117	1165	1165	1177	1172	117	117	1165	1167	1167	117	117	1167	1162	1167	
	:25	260	"	1137	115	115	1155	1152	1152	115	1155	1157	1152	1152	1152	1157	116	1162	1155	1152	116	
	:45	280	"	1125	114	114	1142	114	114	1017	1100	113	113	114	114	1142	1145	115	114	114	1145	- 140
	:45½	280½								100												- 140.2
	:46	282								50	50											
	:46½	283½	"																			
	:55	292	"	1117	1132	1125	1135	1125	1135			101	108	113	1125	113	1137	1137	1135	1132	1127	- 145
	:58	295	"									50										
	2:00	295	"										100									- 147.5
	:02	297	"										50									
	:05	300	"	1062		1082		1077		1085		112		111		109		110		109		Temp
	:05	300	"	1105	1122	1125	113	1135	1137					1105	1097	112	112	113	112	112	1122	
	:14	309½	"												100							
	:15	310	"	1095	1117	1117	1122	1117	112					1037	93	1102	1105	112	111	1105	1102	- 154.7
	:17	312½	"											100	50							- 156.2
	:20	315	"											50								
	:25	320	"	108	1102	1105	1105	1102	111							116	116	116	1097	1072	104	- 161.2
	:27½	322½	"																		100	- 162.5
	:30	325	"														100					- 162.7
	:32½	327½	"																		50	
	:34	329	"														50					
	:34½	329½	"																	100		- 164.5
	:35	330	"	106	118	109	1087	1085	1097							50						
	:42½	337½	"															107	106	87		
	:45	340	"	1027	1062	1067	106	106	1082										100			- 169.2
	:47	342	"															100	92			- 170
	:48	343	"																50			
	:50	345	"	100														50				
	:55	350	"	94	102	1022	100	102	107													- 172.5
	:57½	352½	"		100	100		100														- 175
	3:00	355	"	50																		- 176.2
	:02	357	"				50															
	:05	360	"		78	87		50	104													

DATE	TIME	MIN	AMPS	210	213	211	214	212	215	216	217	218	219	220	223	224	225	226	228	229	230	
	3.05	360		118		113		113		108		109		112		113		114		114		Temp
8/31/08	3.06	361	30			50																
	.07	362	"		50																	
	.15	370	"						10.0													-1.85
	.25	380	"						87													
	.29	384	25						71													
								Charge #7														
8/31	PM 5.15	0	30	1015		1047		104		99		995		1015		102		103		103		Temp
	8.15	180	"	1002		102		1017		99.7		101		1012		1012		1026		1027		"
	11.15	360	"	99		101		1002		1017		102		1024		1019		1032		103		"
9/1	AM 2.15	540	"	102		105		106		1055		108		107		106		1076		107		"
	5.15	720	"	103		1022		1066		106		1076		1092		107		109		108		" Barometer
	8.15	900	"	102		1055		1065		105		1077		1077		1065		1075		1067		"
	8.15	900	"	1825	1822	1817	182	1807	1807	1785	178	1792	179	179	179	1802	179	180	180	1795	180	P.D.
								Discharge #7														
9/1	AM 8.18	—	0	157	157	157	157	156	156	154	154	154	154	154	155	155	155	155	156	155	155	
	.20	0	30	147	147	146	146	146	146	144	144	144	144	144	145	145	145	146	145	144	144	
	.23	3	"	1397	1397	140	140	140	140	138	1386	138	138	138	139	1395	1395	140	1396	1395	1395	
	.26	6	"	1375	1377	138	138	138	1385	1367	1367	137	137	1375	1375	138	138	138	138	138	1377	
	.30	10	"	1362	1365	1367	137	137	1372	1352	1352	1355	1355	1366	136	1362	1365	1365	1367	1365	1367	
	.40	20	"	1344	1347	1345	1345	1347	132	1337	1337	132	132	1332	1332	1344	134	1342	1347	1337	1337	
	.50	30	"	132	1322	1322	1322	1327	132	1312	1312	1302	1307	1312	1312	1317	1317	1312	132	1315	1315	
	9.00	40	"	1302	1302	1302	131	1302	1312	1297	1297	129	129	1297	1292	131	130	1297	1302	130	1297	
	.20	60	"	100		103		104		10292		106		105		1035		1052		1047		Temp
	.30	60	"	128	1282	1265	1267	1267	1267	1265	1265	1265	1265	1267	1267	127	1272	128	128	127	127	
	.40	80	"	126	1262	1262	1262	1262	1262	1242	1242	1247	124	1245	1247	1252	125	1252	1252	1245	1245	

Notebook, N-06-03-10


06-03-15
Sec. 5
#3
Sec. 6
Sec. 7
#4
Sec. 8
HOT
TEST
Sec. 1
#1
Sec. 2
Sec. 3
#2
Sec. 4
door
Sec. 1.
#1
Sec. 2.
Sec. 3.
#2
Sec.
BOARDS
RACKS.
door
S
E
W
N

Notebook, N-06-08-27.1

Ordnance Dept. E18 Cells.

	TIME	Total Volts	#	
8/27/06 8/28	9.00 A.M. 1.00 A.M. 1.40 P.M. 6 37	on chg @ 40 off – 15 hrs. on discha @ 30 20		Run #15.
8/28 8/29	7.04 P.M. 12.04 A.M. 12.04 A.M. 3.53 A.M.	on chg @ 30 off – 5 hrs on discha @ 30 20		Run #16.
8/29	7.00 A.M. 12.00 P.M. 12.00 P.M. 3.40 P.M.	on chg @ 30 off – 5 hrs. on discha 20 103 71 68 80 115 109 114 116 72 117 115 114 100 112 116 117 115 71 70 114		Run # 17
8/29 8/30	7.00 P.M. 12.00 A.M. 12.00 A.M. 3.32 A.M.	on chg @ 30 off – 5 hrs. on discha. 20		Run # 18
8/30	7.00 A.M. 12.03 P.M. 12.03 P.M. 4.47 P.M.	on chg @ 30 off – 5 hrs. on discha @ 30 15		Run # 19
8/31	1.00 A.M. 11.03 " 11.03 " 3.53 P.M.	on chg. @ 30 off on discharge 19.8 102 66 61 99 108 114 112 112 68 112 111 109 104 109 112 109 104 65 64 101	–10 hrs	Run # 20
8/31 9/1	7.00 P.M. 12.00 A.M. 12.00 A.M. 4.02 A.M.	on chg @ 30 off on discharge 20		Run # 21
9/1	7.00 A.M. 12.00 P.M. 12.00 P.M. 4.05 P.M.	on chg @ 30 on discharge 20		Run # 22

Stood over Sunday, Labor Day.

	Time	Total Volts		
9/4/06	7.00 A.M.	—	on charge @ 30	Run #23.
	12.00 PM	—	off	
	12.00		on discharg @ 30	
	3.35 AM	20		
9/5/06	7.00 A.M.	—	on charge @ 30	Run #24
	12.	—	off.	
	12.00	—	on discharge @ 30	
	3.38	20		
9/5/06	7.00 A.M.	—	on charge @ 30	Run # 25
	12.00 AM	—	off	
9/6/06	12.00 AM	—	on Discharge @ 30	
	3.56 AM	20		
9/6/06	7:00 A.M.	—	on charge @ 30	Run #26
	12.00 A.M.	—	off	
	12.06 A.M.	—	on discharge @ 30	
	3.47 P.M.	20	105 70 Run 112 118 120 119 119 105 119 118 116 72 115 119 119 119 97 71 118	
9/6/06	7.00 P.M.	—	on charge @ 30	Run # 27
9/7/06	12.00 AM	—	off	
	12.00 AM	—	on Discharge @ 30	
	3.28 AM	20		
9/7/06	7.00 A.M.	—	on charge @ 30	Run # 28
	12.00 A.M.	—	off	
	12.00	—	on Discharge @ 30	
	3.30	20	98 67 – 113 118 120 120 120 66 119 118 114 72 116 119 118 118 74 71 118.	
	7.00 P.M.	—	on charge @ 30	Run # 29
9/8/06	12.00 A.M.	—	off.	
	12.00 A.M.		on Discharge @ 30	
	3.25 A.M.	20		
9/8/06	7.00 A.M.	—	on charge @ 30	Run #30
	12.00 A.M.	—	off	
	12.00 AM	—	on Discharge @ 30	
	4.00		off	

	Time	Total Volts	
9/10/06	8.10 A.M.	—	on charge at 30 — Run # 31
	12.00 M	—	off
	1.10 P.M.	—	on chg. again
	7.20 P.M.	—	off — 5 hrs.
	7.20 "	29.2	on discharge @ 30
	5.47 "	20	78 67 – 116 120 121 120 120 58 120 119 109 73 115 120 120 120 73 72 119
9/10/06	7.00 P.M.	—	on charge @ 30 — Run # 32.
	12.00 A.M.	—	off
	12.00 A.M.	—	on Discharge @ 30
	3.29 A.M.	20	
9/11/06	7.00 A.M.	—	on charge — Run # 33
	12.02 P.M.	—	off
	12.02 P.M.	—	on discharge
	4.00 P.M.	—	off – no [illegible] – calls [illegible] charge —
9/11/06	7.00 P.M.	—	on charge — Run # 34
	12.00 A.M.	—	off
9/12/06	12.00 A.M.	—	on Discharge
	3.01 A.M.	20	
9/12/06	7.00 A.M.	—	on charge @ 30 — Run # 35
	12.00 M.	—	off
	1.45 P.M.	—	on chg again
	6.45 P.M.	—	off — 10 hrs
	6.45 P.M.	—	discharge @ 30
	6.45 P.M.	—	on Discharge @ 30
	11.15 P.M.	20	off
9/13/06	7.00 A.M.	—	on charge @ 30 — Run # 36
	12.00 M.	—	on discharge
	3.22 P.M.	20	off
9/14/06	7.00 P.M.	—	on charge @ 30 — Run # 37
	12.00 A.M.	—	off
	12.00 A.M.	—	on discharge @ 30
	3.16 A.M.	20	off
	7.00 A.M.	—	on charge @ 30 — Run # 38
	12.05 P.M.	—	on discharge
	3.20 "	20	74 69 – 115 120 121 120 118 73 120 120 78 73 115 120 121 120 75 102 119

Run #30

9/19/96 8:00 P.M.	—	on change @ 30
9/20/96 12:00 A.M.	—	off
9/20/96 3:31 A.M.	—	on Midnight @ 30
	20	off

10/1/96	Actuals	Midnight = 40 @ 51 — 40
		on change
	40	off
	40	on
		off
10/2/96	Actuals	Midnight = 0 @ 0

Endurance Test.

Treated "E" & Cells.
Previous History and Regular Runs are in Vol. 9, "Sow Capacity" Also in Report Book.

DATE	TIME	AMPS	9337	9336	11475	11497	11511	11533	11543	11609	11571	
10/21/07	9:00 A.M.	40	on charge									Run # 151.
	12:00	"	off - 4 hrs.									
	12:00 P.M.	30	on discharge									
	3:50 "	"	—	—	25	42	38	—	29	—	46	
	4:00 P.M.	40	On charge									Run # 152
	8:00	"	off - 4 hrs									
	8:00 "	30	on discharge									
	12:00 M.	"	off 4 hrs.									
10-22-07	12:00 M.	40	On charge									Run # 153
	4:00 AM	"	off 4 hrs									
	4:00 "	30	on discharge									
	8:00 "	"	off 4 hrs.									
	8:00 "	40	On charge									Run # 154
	12:00 Noon	"	off - 4 hrs.									
	12:03 Noon	30	On Discharge									
	4:00 P.M.	32	—	—	27	43	35	—	26	—	45	
	4:00 P.M.	40	On charge									Run # 155
	8:00 "	40	Off charge 4 hrs									
	8:00 "	30	On Discharge									
	12:00 M.	"	off Discharge									
10-23-07	12:00 "	40	On charge									Run # 156
	4:00 A.M.	"	off 4 hrs									
	4:00 "	30	On discharge									
	8:00 "	20	off 4 hrs.									
	8:00 "	40	On charge									Run # 157
	12:00	40	off - 4 hrs.									
	1:00	30	On Discharge									
	3:56	20	—	—	2	47	40	—	—	—	51	
	4:00	40	On charge									Run # 158
	8:00	"	Off 4 hrs									
	8:00	30	On Discharge									
	12:00	32	off 4 hrs									
10-24-07	12:00	40	On charge									Run # 159
	4:00	"	off charge 4 hrs									
	4:00	30	On discharge									
	8:00	"	off 4 hrs									
	7 8:00	40	on charge									Run # 160
	12:00	"	97.2	97	97.2	99	97.2	97.2	100	97.2	95.7	- Temp. in Lab. off till in °F. Room 75°
	12:00	30	on discharge									
	3:44	"	115.5	109	112.5	105	109	109.5	104.5	109	104.5	- Temp. °F - Room 78°
		"	—	—	—	10	44	39	—	10	—	51 - R.B.

DATE	TIME	AMPS	1850	1884	1475	1497	1514	1433	1443	1469	1151	
10/24/07	4:00 PM	40	On charge									Run # 161
	8:00	"	Off 4 hrs									
	8:00	30	On Discharge									
	12:00	31	off 4 hrs									
10/25/07	12:00 AM	40	On charge									Run 162
	4:00	"	off 4 hrs									
	4:00	30	On discharge									
	7:57	29	off 4 hrs									
	8:00	40	On charge									Run 163
	12:00	"	off 4 hrs									
	12:00	30	On Discharge									
	3:45	30	— — 19	46	40	5	10	-	49			
	4:00	40	On charge									Run # 164
	8:00	"	Off 4 hrs									
	8:00	11	On Discharge									
	11:56	30	off									
10/26/07	12:00	40	On charge									Run # 165
	4:00	"	off 4 hrs									
	4:00	30	On Discharge									
	7:35	30	off									
	8:00	40	On charge									Run # 166
	12:00	30	off 4 hrs									
	12:00	30	On discharge									
	3:55	30	— — 11	45	39	—	10	-	46			
10/28/07	8:00 AM	40	On charge									Run # 167
	12:00	"	off — 4 hrs									
	12:00	30	On Discharge									
	3:35	30	29	46	42	—	2	-	50			
	4:00 PM	40	On charge									Run # 168
	8:00	"	Off 4 hrs									
	8:00	30	On Discharge									
	11:43	"	off Discharge									
10-29-07	12:00 AM	40	On charge									Run # 169
	4:00	"	off 4 hrs									
	4:00	30	On Discharge									
	7:49	"	off									
	8:00 AM	40	On charge									Run # 170
	12:00	"	96 98 99	100	99	99	97	99	97	96		Temp. 07 - Room 78°
	12:00 PM	30	On Discharge									
	3:53	30	105 105	104	105	101	106	105	104	99		Temp. 07 Room. 76°
	4:00 PM	40	On Charge									Run # 171
	8:00	40	Off 4 hrs.									
	8:00	30	On discharge									
	11:51	30	off charge									

15

20

DATE	TIME	AMPS	7837	7839	11475	11499	11514	11533	11543	11599	11751		
10/30/07	12:15 AM	40	On charge										Run 172
	4:15	"	off 4 hrs										
	4:15 AM	30	On Discharge										
	8:01	"	off										
	8:02 AM	40	On charge										Run #173
	12:00	"											
	12:00 PM	30	On Discharge										
	3:44	30		-	20	46	45		10	-	47		
	4:00 AM	40	On Charge										Run # 174
	8:00	"	off 4 hrs										
	8:00	30	On Discharge										
	11:07	"	off										
10/31/07	12:00	40	on charge										Run #175
	4:00	"	off 4 hrs										
	4:00	30	on discharge										
	1:38	"	off										

(215)

Endurance Test

New E18 Cells.

#22763 - 210 KOH - Has had 22 runs.
22761 - 210 + 30g SiO2 pail. - " 25 "

Treated S.C. Cells.

#12372, 12854, 14396 } 210 KOH + 15g SiO2 pail. Had 19 runs.
14311, 14375, 14563 } 210 KOH Reg. Had 19 runs.

Give 50 runs, charging 4 hrs. @ 40 and discharging @ 30 4 hrs. or less.

W.E.H.

Date	Time	Amp.	22761	22767	12372	12854	14306	14311	14375	14563	
12/2/07	4 00	40	On charge								Charge #1 12/2/07
	8 00		Off 4 hrs								
	8 00	30	On discharge								
	12 00	30	108	116	42	33	40	47	–	54	
12/3-07	12 10	40	On charge								Charge #2 12/3/07
	4 10	40	off 4 hrs								
	4 10	30	on Discharge								
	8 00	"	off								
	8 00	40	On charge								Charge #3 12/3/07
	12 00	"	Off 4 hrs								
	12 00	30	On discharge								
	4 00	30	116	110	46	37	46	52	–	58	
	4 00	40	On charge								Charge #4 12/3/07
	8 00	40	Off 4 hrs								
	8 00	30	On discharge								
	12 00	30	off discharge								
12-4-07	12 00	40	On Charge								Charge #5 12-4-07
	4 00	40	off 4 hrs.								
	4 00	30	On discharge								
	8 00	"	off discharge								
	8 00	40	On Charge								Charge #6 12-4-07
	12 00	40	off 4 hrs								
	12 00	30	On discharge								
	4 00	30	113	63	41	20	41	44	–	48	
	4 00	40	On charge								Charge #7 12/4/07
	8 00	40	Off 4 hrs								
	8 00	30	On discharge								
	12 00	30	off discharge								
12-5-07	12 00	40	On charge								Charge #8 12/4/07
	4 00	"	off 4 hrs								
	4 00	30	On Discharge								
	8 00	"	off Discharge								
	8 00	40	On Charge								Charge #9 12/5-07
	12 00	40	off								
	12 00	30	On Discharge								
	4 00	32	111	108	40	30	42	49		54	
	4 00	40	On charge								Charge #10 12/5/07
	8 00	40	Off 4 hrs								
	8 00	30	On discharge								
	12 00	"	off discharge								
12-6-07	12 00	40	On charge								Charge #11 12/6/07
	4 00	"	off 4 hrs.								
	4 00	30	On Discharge.								
	8 00	"	off Discharge								

Date	TIME	AMP.	12-3-6	2-3-6	12-7-2	12-8-4	14-3-6	14-3-1	12-3-2	14-1-5	14-1-6	14-6-3	14-6-6	14-4-6	14-4-7	
11/6/07	8.00	40	On charge													Charge #12 2/6/07
	12.00	11	off													
	12 00	30	On Discharge													
	4 00	31	12	72	43	33	40	44	44							
			Stood over Sat + Sunday													
12/9/07	A.M. 8.00	40	On charge													Charge #13 12/9/07
	12.00	11	off													
	12 00	30	On Discharge													
	4 00	30	111	59	42	-	32	40	2	38						
	4 00	40	On charge													Charge #14 12/9/07
	8 00	40	off													
			Cell # 14106 - 14642 put in for two mm. 10-4-12.													
	8 00	30	On discharge													
	12 00	11	off													
12/10/07	12 00	40	On charge													Charge #15
	4 00	11	off													
	4 00	30	On discharge													
	8 00	11	off													
12/10/07	8 00	40	On charge													Charge #16
	12 00	11	off													
	12 00	30	On Discharge													
	4 00	30	111	31	38	-	31	36	-	25	-	-	90	33	102	
	4 00	40	On charge													Charge #17
	8 00	40	off + hold													
	8 00	30	On discharge													
	12 00	11	off													
12-11-1907	12 00	40	On Charge													Charge #18
	4 00	11	off + hold Chg.													
	4 00	30	On Discharge													
	8 00	11	off													
	8 00	40	On charge													Charge #19.
	12.58	11	off													
	12 00	30	On Discharge													
	4 00	32	109	-	36	-	30	34	-	23	-	-	71	-	101	
	4 00	40	On charge													Charge #20
	8 00	40	off charge													
	8 00	30	On discharge													
	2 00	30	off													

DATE	TIME	AMPS	2276	2263	2272	2264	2266	2271	2273	2263	2262	2265	2262	2269		
12-12-07	12 00	40	On Charge													Charge #21 off
	8 00	"	off 4 hrs													
	4 00	30	On Discharge													
	8 00	"	off													
	8 00	40	On charge													Charge #22 off
	11 55	40	off													
	12 00	30	On Discharge													
	4 00	30	111	41		33	38		30	-	-	84	30	104		
	4 00	40	On Charge													Charge #23
	8 00	40	off 4 hrs													
	8 00	30	On discharge													
	12 00	"	off													
12-13-07	12 00	40	on charge													Charge #24
	4 00	40	off 4 hrs													
	4 00	30	On Discharge													
	8 00	"	off													
	8 00	40	On charge													Charge #25
	12 00	"	off													12/13/07
	12 00	30	On Discharge													
	4 05	30	110	39	6	34	40	-	42	-	-	100	31	103		
12/16/07	8 00	40	On charge Stock over Sat & Sunday													
	12 00	40	off													Charge #26
	12 00	30	On Discharge													12/16/07
	4 00	30	101	39		33	40					05		103		
	4 00	40	On charge													Charge #27
	8 00	40	Off 4 hrs													
	8 00	30	On discharge													
	12 00	"	off													
12-17-07	12 00	40	On charge													Charge #28 off
	4 00	"	off													
	4 00	30	On discharge													
	8 00	"	off													
	8 00	40	On charge													Charge #29 off
	11 55	40	off													
	12 00	30	On Discharge													12/17/07
	4 00	30	111	45	39	12	39	42	-	47	-	-	103	31	103	
	4 00	40	On charge													Charge #30
	8 00	40	Off 4 hrs													
	8 00	30	On discharge													
	12 00	"	off													

DATE	TIME	AMPS	2761	2760	2372	12574	14326	14911	14375	14576	14706	14615	14724	14640	14642	
12-18-07	12:00	40	On Charge													Charge #31
	4:00	40	Off 4 hrs													
	4:00	40	On Discharge													
	8:00	11	off													
	8:00	40	On Charge													Charge # 32
	11:56	11	off													
	12:00	30	On Discharge													
	4:00	1	110	-	39	16	39	40	L	#3	-	-	105	36	103	
	4:00	40	On Charge													Charge #33
	8:00	11	off 4 hrs													
	8:00	30	On Discharge													
	12:00	1														
12-19-07	12:00	40	On Charge													Charge # 34
	4:00	11	off 4 hrs													
	4:00	30	On Discharge													
	8:00	1	off													
	8:00	40	On Charge													Charge # 35
	12:00	11	off													
	12:00	30	On Discharge													
	4:00	30	107	-	37	10	34	34	-	36	-	-	99	14	102	
	4:00	40	On charge													Charge # 36
	8:00	11	Off 4 hrs													
	8:00	30	On discharge													
	12:00	1	off													
12-20-07	12:00	40	On charge													Charge # 37
	4:00	11	off 4 hrs													
	4:00	30	On Discharge													
	8:00	1	off													
	8:00	40	On Charge													Charge # 38
	12:00	40	Off 4 hrs													
	12:00	30	On discharge													
	4:00	30	109	-	39	10	6	40	L	#3	-	-	104	32	103	
			Stood over Saturday + Sunday													
12/23/07	8:00	40	On Charge													Charge # 39
	12:00	11	off													
	12:00	30	On Discharge													
	4:00	30	111	-	40		30	36	39	-	-	98	-	103		
	4:00	40	On charge													Charge # 40
	8:00	40	Off 4 hrs													
	8:00	30	On discharge													
	12:00	1	off													

DATE	TIME	AMPS	22-261	12-323	12-324	TEST #	14011	14525	14523	14506	14505	14502	14501	14504								
12-24-07	12 00	40	On Charge												Charge #41							
	4 00	"	off 4 hrs																			
	4 00	30	On Discharge																			
	8 00	"	off																			
	8 00	40	On Charge												Charge #42							
	12 00	"	off 4 hrs																			
	12 00	30	On Discharge																			
	4 00	28	103 - 40 - 28	13	12	71	-	-	86	-	103											
			Stood over Wednesday (Xmas)																			
12-26-07	8 00	40	On Charge												Charge #43							
	12 00	"	off - 4 hrs.																			
	12 00	30	On Discharge																			
	4 00	"	100 - 33 - 16	18	-	-	-	-	56	-	97											
	4 00	40	On charge												Charge #44							
	8 00	"	off 4 hrs																			
	8 00	30	off Discharge																			
	12 00	"	off																			
12-27-07	12 00	40	on charge												Charge #45							
	4 00	"	off 4 hrs																			
	4 00	30	On Discharge																			
	8 00	"	off																			
	8 00	40	on charge												Charge #46							
	12 00	40	off 4 hr.																			
	12 00	30	On Discharge																			
	4 00	30	102 - 33 - 16	22	-	-	-	-	54	-	97											
			Stood over Sat + Sunday.																			
12/29/07	8 00	40	on charge												Charge #47							
	12 00	"	off - 4 hr.																			
	12 00	30	On Discharge																			
	4 00	32	102 - 33 - 20	24	-	-	-	-	56	-	99											
	4 00	40	On charge												Charge #48							
	8 00	40	Off 4 hrs																			
	8 00	30	On discharge																			
	12 00	"	off																			
12-31-07	12 00	40	on charge												Charge #49							
	4 00	"	off 4 hrs.																			
	4 00	30	off Discharge																			
	8 00	"	off																			
	8 00	40	on charge												Charge #50							
	12 00	40	off - 4 hr.																			
	12 00	30	On Discharge																			
	4 00	36	103 - 25 - 12	18	-	-	-	-	65	-	93											

Notebook, N-06-11-08

TUBES. Set #1.

Given one regular run with readings on the sheets and then sent in to Hooper, 3/12/07, to run on Hot Test.

Received again 4/15/07. Have had 50 runs on Hot Test and 4 reg. runs on Hooper's boards.

	Time	Amp	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407
Charge # 81	2.00 am	150			6 hr		Charge					
4/16/07	8.40 am	11				off						
Discharge # 81	8.45	150	149^5	149	149^2	149^2	149	149^5	150	148^2	148^5	147
4/16/07	49	11	143	144	143	143^5	144	143	143^5	143	143	142
	55	11	141	140^5	141	141	141	140^5	141	140	141	137^7
	9.06	11	138^5	137	135	138	138	138	138^5	137	137	136
	25	11	134^2	134^5	135	134^2	135	134	133^5	133^2	134	133
	46	11	132	131^7	132	132	133	132^2	132	130^7	131^5	130
	10.05	11	130	130	131	130^5	131	130^5	130^2	130	130^2	128
	25	11	129^5	129^7	130	130^2	130	129^7	130	128	129^5	127
121	46	11	128	128	128^5	128^2	129	128^5	128^2	127	128	126^7
	11.05	11	127^5	127	128	127^7	128	128	128	126	127^5	125^7
	25	11	126	126	127	125^7	127^5	126^5	127	126	127	124^5
181	45	11	126	125^7	126^2	126	126^2	126	125^7	124^5	126^2	123^5
	12.05	11	124^5	124^5	125^5	125^5	125^5	125^5	125^5	124	125	122^5
	25	11	123^5	122^2	124	124	124	124	124	122^7	124^2	121
200	45	11	122^2	122	123	123	123	123	123	122	123^5	119^7
260	1.05	11	120^2	120	122	120	121^3	121^7	121	120	120^7	106
	.07	11										100
	15 17	11	119^5	118	120	121	120	120^5	120	119	100	
280	25	11	118	114	119^5	120^2	118	119^5	118	118	1	
	29			100								
	30											
	31											

6 2/3 hrs.

5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
148	147	147	149	149^5	148^2	147	149	150	148	148^5	148^2	148^5	148	
143	143	142	144	144^5	144	142	144	144	144	143^5	144	144^5	143^5	
140	140	139^5	142	142	141	140	142	141	141	141^5	142	142	141	
138	137	137	138	139^5	138^2	136	139	139^5	140	139^7	139^7	140	138	
134	134	133	135	136	135	133	136	136	136	135	136^5	137	135	
132	131	131	133	134	133	130^5	133	133	133^5	132^2	134	134	132	
130	129^7	130	132	132	131	129^7	132	132	132	131	132^5	133	131^5	
129	128	128^2	130^2	131^5	130	128	131	130^5	131	130^5	131^2	132	130	
128	127^5	128	129^5	130	129^7	127^5	130	129^7	130	129	130^2	130^5	129^7	
127	126	127	128^5	129^2	128^2	126^2	129^2	129	129	129^5	130	130	128^2	
126	126	126	128	128^2	128	126	128^2	128	128	127^7	129	129^5	128	
125	125	125	127	128	127	125	128	127	127	127	128	128	127	
124	124	124	126^5	126^7	126	123^5	127	126	126^5	126^5	127	127	126^5	
123	123	123	124	126	125	122	126	125	126	126	126^2	126^5	125^7	
122	121^7	122	124	125	124	120^2	125	124	124	123^7	125	125^5	124	
120	120	120	123	123	122^5	118	123	122	123	122^5	124	124	123	655
														675
118^2	119	119	122	122	120^5	117	122	120^5	122	121	122^5	123	121^7	
116	117	117	121	120^5	118	115	121	118	120	120	122	122	120	
100														710
					100									712
														715

	Time	Gauge	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
-290	1.33	150																			100						720
	35	"	1113		114	120	107	117	106	116				104 / 100	116	118	116		96	116		116	98	120	121	118	725
	36	"																									
	37	"					100																				727
	37½	"													100												730
	38	"	100		100															100							731
	38½	"															100					100					732
	39	"														100											733
	40	"						100																			735
	41	"																								100	737
.300	45	"				118				110														100	118		740
	47	"								100																	750
	50	"																							100		755
310	55	"				166^2																					762
	56	"				100																					777
Charge # F2	7.30	150	154	154	155	155	154	155	156	156	158	159	156	156	156	154	155	155	156	154	155	155	156	155	154	156	
4/17/07	35	"	160	160	160	160	159^2	161	160^4	162	163	166	160	161	161	159	160	161	160^5	160	160^2	161	161	160	159^4	160	
X – 6 2/3 hrs.	40	"	163	163	163	164	162	164	162	164	164	167^4	162^5	163	164	162	162	163	163	162^2	163	163	163	162	161	162	
	50	"	167	167	166^2	167	166	166^2	166	168	167	169	167	168	167	164	165	165	167	164	165	165	165	165	164	165	
	8.00	"	168	168	167^5	168	167	167	167	168^2	168	171	168	169	168	168	166	165^2	168	166	166	166	166	166	166	166	
	10	"	169^7	170	169	169	168	168^2	168	169^7	169	172	169	170^5	169^7	167	167	167	170	166	168	167	168	167	166	169	
1	30	"	170^5	170^2	170^1	171	170	170^2	170	171	170^5	173	171	172	171	169	168^1	169	171^1	168	169^5	169	169^2	168	168	169^4	
	50	"	170^5	170	170	171	170	170^2	170	171^4	170^2	172^5	171	171	171	169	169	169	171	168	169^4	169	169^2	168^5	168^2	168^2	
	9.10	"	169^7	169^5	169^2	170	169	169^7	169	171	170	171^1	170	170^2	170	168	168	168^2	170	168	168^1	168	168	168	168	167^7	
2	30	"	169^5	168^2	168^5	170	168	169	168	170^2	169^4	171	169^7	170	170	168	167^7	169^4	169^2	167	165	168	168	167^7	167^4	167	
	50	"	169	168	168	169	167	168	167^7	170	168^2	170^2	169	169	169	167	167	167	168^2	166^4	168^5	167^7	165^5	167	169	166^2	
	10.10	"	168	167^7	168	168^1	165^5	168	167	169^5	168	170	168	168^2	168^5	166	168	166	166	166	167	167	166^5	166^2	166^2	166	
3	30	"	168	167^7	167	168	167	168	166	169	167^7	170	168	167^7	168	166	166	166	167^4	167^4	166^2	166	166	166	166^2	165^7	
	52	"	167^7	167	167	168	166^5	168	166	169	167^7	169^5	168	167^5	168	166	165^2	166	167	165^7	166^5	166	166	166	166^2	165^7	
	11.10	"	167^5	166^7	166^5	167^5	166^2	168	166	168^5	167	169	167	167	168	166	165^7	166	167	165	166	166	166	166	165^7	165	
4	30	"	167	166	166	167	166	167	166	168^2	167	169	166^5	167	167^7	165^7	165	166	166^2	165	166	165^2	166^5	166	165^5	165^7	
	50	"	166^2	166	166^2	167	166	166^5	165	168	167	168^5	166	167	168	166	165^4	166	166	165	166	165^2	165^7	166	165	165^7	
	12.10	"	166^2	166^5	167	167	166	167^4	166	167	167	168^2	166	167	168	166	165	166	166	165	166	165	165^7	166	165^5	165^7	

4/17/07

Note	Time	Amp.	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
5	12.30	150	166^2	167	167^5	167^2	166^5	167	167^2	168^5	167	168^2	166^5	167	168	166^2	165^7	166	166^5	165^7	166	165^7	166	166	166	164	
$6\frac{2}{3}$ hrs @ 150 m.a.	50	"	166	167	167	166^5	166	166	167^1	168^2	168	168^5	166^5	167^5	168	166^5	166	166^2	167	166	166	166	166	166	167	166^5	
	1.10	"	166^5	167^1	168^7	166	166	168	168	169	168	169	166	168	168^7	167	166	166^2	167	166	167	166	166	166	167	166	
6	30	"	167	168	168^2	166	167^5	168	168	169	168	169	167	168	169	168	167	167^1	167	166	167	166^2	166	166	167	167	
	50	"	167	168	169	168	168^1	168	168	169^5	168	169	167	168	169^2	168	167	166^5	167	166	167^1	167	166^5	166	168	167	
	2.10	"	167	168	168	168	168	168	168	169^5	168	169	167	168	169^5	168	167	167	167	167	167^7	167^5	166	167	168	167^5	
Discharge 82	2.15	"	150	149	150	149^5	149	149	149	149^5	148^2	147	148	148	147	148^1	149	148	147	148^2	148	148^1	148	149	149^5	148	
4/17/07	20	"	144	143	144	144	144	143	144	143	143^5	142	142^2	143	142	144	144	144	142	144^5	144	144	144	144^5	145	144	
	26	"	141	140	141	141	141	140^5	142	140^5	140^5	139^7	141	140^1	140	142	142	142	139^7	142	141	142	141^7	142	142	142	
	35	"	139	138^5	139	139	139^2	139	139	138	138^2	137	139	138^5	137^7	140	140	139^7	137	140	139^7	140	140	140^2	140^2	139^7	
X – $6\frac{2}{3}$ hrs.	55	"	135	135	136	135^7	136	135^7	136	134	135	133	135^5	135	134^2	136	137	137	133	137	136	137	136	137^5	138	136^2	
	3.15	"	133	132	133	133	134	133	133	132	132	130^5	132	132	132	134	135	134^5	130	134	134^2	134	134	135	135^7	133^5	
	35	"	131^7	130^5	132	131^5	132	131^5	132	130	131	128^5	131^2	130^5	130	132	133	132	129^7	133	132	133	132	133^5	134	132^2	
	55	"	130	129^5	130^2	130	130	130	130	129	130	127^5	130	129^5	129^7	131	132	130^5	128	132	131	132	131	132	133	130^5	
120	4.15	"	128^2	128	129^5	128^2	129^5	129	129	128	128^2	126	128	128	128	130	131	130	127^7	130^5	130	130^2	130	131	131^5	130	
	35	"	128	127^5	128	128	128	128	128	127	128	125^5	127^7	127	127	129	130	129	126^5	130	129	130	129	130	130^2	129	
	56	"	126^2	126	127	127	127	127	127	126	127	124^2	126^2	126	126	128	128^5	128	125^7	129	128^5	128^2	128	129	129^5	128	
150	5.15	"	126	126	126^2	126	126^2	126	126	125	126	123^7	124^7	125^5	125^5	127^5	128	127^5	124^2	128	127^5	128	127^1	128	128	127^7	
	35	"	125	124^7	126	125^7	125^5	125^2	125^5	124	126	122^2	124^1	124	124^2	126^5	127	126^2	123^5	127	126	127	126	127^7	128	126^5	
	55	"	124	123^7	124^5	124^5	124^5	124	124	123^5	125	122	124	123^5	123	126	126	125^5	122	126	125	124	125	126	124^5	126^5	
240	6.15	"	122^2	122	123^5	123^5	123^2	123^2	123	122	123^7	120	122	122^2	122	124^2	125	124	119^2	125	124	124^2	124	125	126	126^2	
260	35	"	120^1	120	121^7	122	121^7	122	121^5	120^2	122^2	118	120^2	120^2	120^5	123	123	122^2	116	123^5	122^2	123	122^5	124	124	122^5	
	.62											100															692
280	.55		118^2	100	119	120^2	118	119^5	118	119	119		115	117	117	124	120^2	116	111	120^2	119	120	119^2	122	122	120^5	700
	$.57^5$										100																706
	$.58^5$																100										708
	7.01																		100		100						715
	$.01^5$								100				100										100				716

			5398	5399	5400	5401	5402	5403	5404	5405	5406
	.02										
	.03						100				
	$.04^{5}$		100								
2.90	7.05	150			100	112		116		117	
	.08										
	.09							1.00			
	$.10^{5}$										
	$.12^{5}$										
1.00	7.15					118				112^{5}	
	$.17^{5}$										
	.18									100	
	.25					108					
	.26					100					
Charge # 83	8.05	250			On change						
4/18/07	12.05	″			off						
Discharge # 83	12.10	150	150	149	150	149^{7}	149^{5}	149	149^{7}	149	149
4/18/07	14	″	144	144	144	144	144^{5}	144	144^{2}	143^{7}	144
	20	″	142	142	142	142	142	142	142	141	141^{5}
	30	″	140	139^{7}	140	139^{7}	140	140	140	139	139
	40	″	138	137	138	137^{7}	138^{2}	138	138	137	137
	50	″	136	136	136^{5}	136	136^{5}	134	136	135	136
40	1.11	″	133	132	134	133	134	133^{7}	133^{5}	132	133
	30	″	131^{7}	131	132	131	132^{5}	132	132	131	132
	50	″	130	129^{7}	131	130^{5}	130^{5}	130^{2}	130	129^{7}	130
	2.10	″	128	128	129^{5}	128^{2}	129^{5}	129	129^{2}	128	129
	30	″	128	127^{5}	128	128	128^{2}	128	128	127	128
	1.50	″	126^{2}	126	129	127	127	127	127	126	127
	3.10	″	125	125	126	126	126	126	126	126	126
	.36	″	124	123	124^{5}	124	124^{2}	124	124	123	124^{5}
	50	″	122^{2}	122	123^{5}	124	124	123^{5}	123	122^{2}	124

5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
		100	100												717
															720
								100							723
				118	99					100		119^{5}	121	116	725
														100	732
															735
				100											738
												100			743
													116		
													100		756
															757
															777
		4 hrs.													
147	148	148	147^{5}	149^{2}	150	149	147	149^{7}	149^{5}	149^{2}	149	149^{5}	149^{5}	148^{2}	
142	144	143^{7}	142^{5}	145	145^{2}	145	144	145^{5}	145	145	144^{5}	145	145^{2}	144	
140	142	141^{7}	140^{5}	143	143	142^{5}	140^{2}	143	142^{5}	143	142^{2}	143	143^{5}	142^{5}	
138^{5}	139^{2}	139	138	140^{2}	141	140	137	141	140	140^{7}	140	141	141	140^{5}	
135	137^{5}	137	136^{2}	138	139^{5}	138	135	139^{5}	138^{2}	139	138	139^{5}	139^{7}	138	
133^{7}	136	135^{7}	135	137	138	136^{5}	133	138	137	137^{5}	137	138	138	138	
138^{5}	133	132	133	134	135	134	131	135	134	135	134	135^{5}	136	133^{7}	
129	131	130^{5}	131	132	134	132	129^{7}	133	133	133	132	134	134	132	
128	130	129	129^{5}	131	132	131	128^{5}	132	131^{7}	132	131	132^{5}	133	131	
126^{5}	128	128	128^{5}	130^{2}	132	130^{5}	127	131	130^{5}	131	130	131^{5}	132	130^{2}	
125	127^{5}	127	127^{5}	129	130	129	126^{5}	130	129^{5}	130	129	130	130^{5}	129	
124	126	126	126^{2}	128	128^{5}	127^{7}	125^{3}	129	128	128^{5}	128	129^{5}	130	128	
123	125	124^{2}	125	127	128	127	124	128	127	128	127	128	128	127	
121	123	123	124	126	126^{2}	125^{7}	122	126^{2}	126	126	126	127	127	126	
120	122	122	123	123	126	125	125	126	124^{5}	125	125	126	126	125^{5}	

4/18/07

	TIME																																	
200	4.10	153	125	119	122	121	122	121	121		122	117	119	120	121	124	124	123	118	124	123	124	123	124	124	123		622
	19											100																623
200	2.1	"	118	118	119	121	119	120	119	119		100	96	109	120	122	123	122	118	123	121	122	122	123	122	122		624
	20	"												100														625
	22	"					100																					626
	24	"	100																									627
	26	"						100																				628
	28	"			100																							629
	29	"																										630
200	30	"			120		117		118			100			118	121	121	119	113	122	115	121	120	122	123	121		631
	32	"																100										632
	34	"																			100							633
	36	"																										634
	37	"					100																					635
	38	"																	100									636
	39	"																										637
200	40	"			119					118					118	121				100			100		119	121	117	638
	41	"														100												639
	42	"								100																		640
	44	"													130												100	641
	45	"																										642
	46	"																							100			643
	48	"																								100		644
	50	"			100																							645

Chamit 84
4/19/07

X = 4 hrs.

	TIME																																	
	8.45	250	168	165	169	161	169	160	162	162		161	165	161	162	162	165	165	162	162	160	159	160	165	160	159		646
	50	"	168	168	168	169	168	168	167	169		168	172	168	169	166	167	167	166	165	165	166	165	166	166	169		647
	55	"	170	170	169	170	169	169	168	171		170	174	170	171	171	167	167	168	169	167	167	168	169	167	169		648
	9.05	"	172	172	171	173	171	172	171	173		172	176	172	174	173	170	169	173	174	169	171	170	170	169	172		649
	15	"	172	172	172	172	171	172	171	174		172	175	173	174	174	170	170	174	174	170	170	170	170	170	171		650
	25	"	173	172	172	174	172	173	172	175		172	176	173	173	173	171	171	174	174	172	171	171	170	170	171		651
	35	"	172	172	172	174	172	172	171	175		172	174	172	171	174	170	170	171	170	170	171	170	170	170	169		652
	45	"	172	171	170	173	171	172	171	174		172	175	171	171	173	170	169	169	171	169	170	170	170	170	169		653
	9.05	"	171	170	170	172	170	171	170	173		171	177	170	171	173	169	165	169	170	168	170	169	169	169	168		654
	25	"	171	170	170	172	170	171	170	173		171	172	170	171	173	169	169	169	170	168	170	169	169	169	169		655
	45	"	170	170	170	172	170	171	170	173		171	172	170	171	173	169	169	169	170	168	170	169	169	169	169		656
	10.05	"	170	170	170	171	170	170	170	173		171	172	170	171	173	169	169	169	170	168	169	169	169	169	169		657

	Time	Amp	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
	10.25	250	170^{2}	171	172	170^{5}	170^{5}	171	171	173	171	172^{2}	170^{5}	172	173^{5}	170	169^{5}	169^{7}	170^{2}	169^{7}	170^{2}	169^{7}	169^{5}	170	170	169^{5}	
	45	"	170^{5}	171	172^{2}	170^{7}	171	170^{7}	172	173	171^{5}	173	170^{7}	172	174	171	170^{5}	170	170^{7}	170	170^{7}	170	170	170^{2}	170^{5}	169^{7}	
	11.05	"	171^{7}	171^{5}	173	171	172	171^{7}	173	174	172	173	171^{7}	173	174	172^{5}	171	171	171^{5}	171	171	170^{5}	170	171	171	170^{2}	
4 hrs.	25	"	172^{2}	171^{5}	173	171	172	172	173	174	172	174	172	173	174^{2}	171^{7}	171^{5}	171	171^{5}	171	171	170^{7}	170^{5}	171^{2}	171^{5}	170^{2}	
	45	"	173	172	173	172	172	172	173	175	172	177	171	173	176	172	172	171	172	171^{5}	171^{2}	171	171	172	172	171	
Discharge # 84	11.50	150	150	149^{5}	150	149	149^{5}	149	149^{5}	149	149	147	148	147	149	150	149	147	149	148^{5}	149	148^{2}	149	149	149^{2}	148^{2}	
4/19/07	54	"	144	143^{5}	145	144	145	144^{2}	145	144	144	143	144	144	143	145	145^{5}	145	142^{5}	146	145	145	144^{5}	145^{2}	146	144	
	12.00	"	142	141	142	142	142	142	143	140	141	142	142	142	140	143	143	143	141	144	143	143	142	143	142	142	
X = 4 hrs.	10	"	139	138	139	138^{5}	139^{2}	139	139^{2}	138	138	137	139	139	137	140	140^{5}	140	137	140	140	140	139^{7}	140	140^{5}	139	
	20	"	138	137	137	137	138	137	137	136	137	136	136	136	136^{5}	138	138	138	136	137^{5}	137^{5}	138	137^{5}	138	138	137	
	30	"	136	135	136	134	134	136	136	134	135	133	133^{5}	133^{5}	134	134	136	135	134	136	136^{5}	137	135	136	137	136	
	50	"	133	132	134	132	134	135	134	132	133	130	131	131	132	134	135	134	131	135	134	135	133^{5}	135	136	133	
	1.10	"	131	130^{5}	132	130	132	131	132	130^{5}	131	129	131	130^{5}	130	132	133	132	129^{7}	133	132	133	132	133^{5}	132	132	
	30	"	130	129	130^{5}	129	130^{2}	130	130^{5}	129	130	127	129^{5}	129	130	130^{5}	132	131	128	132	131	132	131	132	133	130^{5}	
	50	"	128^{2}	128	129^{5}	128	129^{5}	129	129	128	129	126^{2}	128	128	128	130	131	130	128	134	130^{2}	130	130	131	132	130^{2}	
	2.10	"	127^{5}	127	128	127	128	128	128	126^{5}	128	125	127	127	127	129	130	129	126^{5}	130	129	129^{7}	129	130	130^{5}	129	
	30	"	126^{2}	126	127	126^{2}	127	127	127	126^{5}	127	124	126	126	126^{2}	128	129	128	126	129	128	128^{5}	128	129^{5}	129^{7}	128	
	50	"	125	124^{5}	126	125	126	126	126	124^{2}	126	123	125	124^{5}	123^{5}	127	128	127	124	128	127	127^{5}	127	128	128	127	
	3.10	"	124	124	125	124	125	124^{5}	125	123	125	122	124	123^{7}	124	126	127	126	123	127	126	126	126	126^{5}	127	126	
	30	"	122^{2}	122	123^{5}	123^{2}	123^{5}	123	123	122	123	120	122	122	122^{2}	124^{5}	125	124^{5}	121	126	124	125	125	126	126	125	
	50	"	120	117	121^{5}	122	121	121^{5}	121	120^{5}	122	116	119^{5}	119^{7}	121	123	124	123	118	124	122^{5}	124	123	124	124^{2}	123	
	57											100															617
	59	"		1.00								96	(622)														622
250	4.00	"	118		119	121	117	120	119	119	120		94	114	120	122	123	121	116	123	121	122	122	124	124	122	625
	02	"												100													630
	06		100				100																				640
	07				100																						642
	07										100																643
	08								100																		645

Time	Angle	0800	0810	0820	0830	0840	0850	0900	0910	0920	0930	0940	0950	1000	1010	1020	1030	1040	1050	1100	1110	1120	1130	1140	1150	1200	1210	1220	1230	1240	1250	
410	150																															600
12	"																															650
13	"																															660
14	"																															661
15	"																															667
17	"																															670
18	"																															675
19	"																															677
20	"																															680
21	"																															677
22	"																															681
24	"																															685
28	"																															690
30	"																															700

Time	Angle	0800	0810	0820	0830	0840	0850	0900	0910	0920	0930	0940	0950	1000	1010	1020	1030	1040	1050	1100	1110	1120	1130	1140	1150	1200	1210	1220	1230	1240	1250	
Charge # 85	710	3.0	162	164	162	163	162	164	162	166	164	165	167	165	166	162	161	162	167	167	164	162	163	162	161	163						
H/2-0/07	12	"	174	174	173	174	172	174	172	176	174	174	174	175	176	171	170	171	175	170	172	171	172	172	171	172						
	20	"	175	175	175	175	175	174	174	178	175	180	176	177	178	175	175	173	177	174	174	174	175	174	170	175						
X - 3 1/3 lbs.	30	"	177	177	176	176	176	177	176	179	177	182	177	178	178	175	174	175	178	174	176	174	175	174	174	175						
	40	"	177	177	176	177	176	177	177	178	177	183	177	177	178	174	175	175	176	174	176	175	176	174	174	175						
	50	"	176	176	177	178	176	176	177	179	176	178	176	176	178	174	173	173	176	173	173	174	174	175	174	173						
	8/12	"	174	174	174	176	175	175	175	178	175	178	174	174	177	173	172	172	174	171	174	172	173	172	172	172						
	30	"	174	174	175	175	173	174	173	174	174	177	174	174	177	172	172	172	174	171	174	173	172	172	172	172						
	50	"	173	173	173	174	173	174	173	175	174	177	174	174	177	172	172	172	174	172	174	172	173	173	173	172						
	9/10	"	173	174	174	174	174	174	174	177	174	177	174	174	177	173	172	173	174	172	174	172	173	173	173	172						
	30	"	174	174	174	174	174	174	175	178	175	177	175	174	178	174	173	173	175	173	175	173	175	174	174	173						
	50	"	176	175	176	176	175	175	176	178	176	178	176	176	178	174	174	175	178	175	178	175	176	175	175	174						
	10/10	"	176	176	176	176	175	176	176	179	176	178	176	177	180	175	175	174	176	174	176	175	175	175	175	175						
	30	"	176	176	176	176	174	175	176	179	176	178	176	177	180	175	175	174	176	174	176	175	176	176	176	176						
Discharge # 85	1033	150	143	149	150	149	149	149	150	149	149	149	147	149	147	149	149	149	147	147	147	149	149	149	149	149						
H/2-0/07	39	"	145	144	145	144	145	145	145	144	144	143	144	144	145	144	145	145	143	143	145	145	146	146	146	145						

TIME	Angle	5398	5399	5400	5401	5402	5403	5404	5405	
	10.55	142	142	141	142	142	142	142	141	
X-3 1/3 hrs.	55	"	140	139	140	139	140	140	140	138
	11.05	"	138	137	138	137	138	138	138	137
	15	"	136	135	137	135	137	136	136	135
60	35	"	134	133	134	132	134	134	134	133
	55	"	132	132	132	131	132	132	132	131
	12.16	"	130	129	131	129	131	130	132	129
120	35	"	129	128	130	128	129	129	129	128
	55	"	128	127	128	127	128	128	128	127
	1.15	"	126	126	127	126	127	127	127	126
180	35	"	125	124	126	124	126	125	126	124
	55	"	125	122	124	123	124	124	124	123
	2.15	"	122	120	122	122	122	122	122	122
	19	"								
240	36	"		100						
	37	"	119		120	121	120	120	120	120
	39	"								
	33	"	100							
	34	"								
	34	"			100		100			
240	35	"				120		118	118	119
	38	"						100		
	39	"							100	
	42	"								
280	45	"				119				114
	47	"								
	47	"								100
	48	"								
	49	"								
	49	"								
	53	"								
	54	"								
260	55	"				114				
	55	"				100				
	3.00									

	5406	5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
	142	142	142	142	142	143	143	143	142	142	142	142	142	143	143	143	
	139	137	140	138	140	141	141	141	140	140	140	141	140	141	140	140	
	137	135	138	137	136	138	139	138	135	139	138	135	138	135	140	138	
	134	134	136	135	137	138	137	137	133	138	137	137	136	138	138	136	
	133	131	133	133	133	134	138	134	138	135	135	135	134	136	136	136	
	132	130	131	132	132	132	134	133	130	134	133	132	132	133	132	133	
	130	127	130	129	130	131	132	131	129	132	132	132	131	132	133	131	
	129	128	128	128	130	131	130	130	132	131	130	130	130	131	132	130	
	128	125	127	127	127	129	130	129	127	129	129	130	129	130	129	129	
	127	124	126	126	126	128	129	128	125	128	128	128	128	129	128	128	
	126	122	124	124	126	127	128	127	124	128	127	126	126	127	128	127	
	124	120	122	123	124	126	126	126	123	126	125	126	126	127	127	126	
	122	116	120	120	122	124	125	124	121	125	124	125	125	126	126	124	600
		100															602
	120		100	118	120	123	124	123	119	124	122	124	123	124	125	123	598
																	595
				100													592
																	598
	100				120	123	123	122	118	123	121	122	122	124	124	123	600
																	607
																	600
											100						607
					116	121	121	118	109	121		120	116	122	123	121	600
									100								607
													100				612
					100			100									612
												100					606
							100		100								606
																100	607
						100								97	114		600
															100		607

Monday Apr. 22th 07

	TIME	Amp	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
Charge # 86	7.05	200	On charge																								
4/22/07	12.05	"			off								5 hrs.														
Discharge # 86	12.10	150	150	149	149^{5}	148^{3}	149	149	149	149	149	147	148	148	147	149	149^{5}	149	147	149^{5}	149	149^{2}	149	149	150	148	
4/22/07	15	"	143	142	143	142	142	143	143	142	143	141	142	142	142	144	144	143	141	144	144	146	144	144	144	143	
	20	"	140	140	140	139^{5}	140^{2}	140	140	141	140	138	138	140	139^{1}	141	142	141	138^{5}	142	141	141	140^{5}	141	141^{5}	140^{2}	
	30	"	138	138	139	138	139	138	139	138	138^{5}	137	138	138	137	138	139^{5}	139	137	141	140	140^{5}	139	140	140	139^{5}	
	40	"	137^{1}	136^{2}	138	136	138	137	138	136	137	136	137	137	136	137^{5}	138^{2}	137^{5}	135	140	139	139	138^{5}	139^{2}	139^{5}	138	
	50	"	136	135	136	134	136	136	136^{2}	134	135	134	135	135	134	136	137^{5}	136	133^{2}	137	137	137	136	138	138	136	
	1.10	"	134	133	134	131^{7}	134	134	134	132	133	131	133	133	133	134	135	134	131	135	134^{5}	135	134	136	136	134	
	1.30	"	132	131	132	129^{7}	122	132	132	131	132	129	132	131	131	132	134	132	130	134	133	133	132	134	134	132	
	1.50	"	130	129^{7}	131	128	131	130^{7}	131	129^{7}	130	128	130	130	130	131	133	130^{5}	129^{7}	132^{5}	132	132	131^{7}	133	133	131	
	2.10	"	129	128^{5}	130	127	130	129^{7}	130	128	129^{7}	127	129	129	128^{5}	129	132	130	128	131	130	130^{5}	130	132	132	130	
	30	"	128	127^{5}	128^{2}	126	128^{2}	128	128	127^{5}	128	126	128	128^{2}	128	129	130^{5}	129^{7}	127	130	130	130	130	131	130^{7}	129	
	50	"	127	126	128	126	128	127^{5}	128	126	127	124^{2}	127	127	127	128	129^{5}	128	126	129^{5}	128^{7}	129	128^{5}	130	130	128	
	3.10	"	126	125	126	124^{2}	126^{2}	126	126	125	126	124^{2}	126	125	125^{5}	127	128	127^{5}	125	128	127	128	127	128	128^{5}	127	
	30	"	125	124	126	124	125^{7}	125^{5}	125^{1}	124	125^{5}	122^{2}	124	124	125^{5}	126	127	126	124	127	126^{5}	127	129	128	128	126^{2}	
	51	"	123	122	124	122	124	124	124	123	124	120^{5}	121	123	124	124^{5}	126	124^{2}	122	126	125	125^{7}	125	126	126^{2}	125	
2.40	4.10	"	122	120	122^{5}	121^{7}	122	122	122	121	122	119	121	121	122	123	124	123	120	124	125	124	124	125	125	124	
	20	"	120	100	121	120	120^{5}	121	120	121	121	100	119	119^{5}	121	122	123	122	118	123	122	123	122	124	124	123	625
	28	"											100														645
	29	"												100													647
260	30	"	114		118	120	100	120	118	118^{5}	118^{2}				119^{7}	121	122	119^{7}	116	122	120	122	120	122	123	122	650
	32	"	100																								655
	33	"			100				100																		657
	34	"									100										100						660
	$34^{1/2}$	"																	10.0								661
	35	"																		100							662
	36	"																					100				665
	$36^{1/2}$	"						100																			666
	37	"													100												668
	38	"																100									670
290	40	"				118				118						118	117					100		120	122	119^{5}	675

	Time	Temp	0.98	0.98	0.10	0.101	0.102	0.103	0.104	0.105	0.106	0.107	0.108	0.109	0.110	0.111	0.112	0.113	0.114	0.115	0.116	0.117	0.118	0.119	0.120	0.121	
	1.12	110																									680
	43	"																									682
	43	"																									683
	45	"																									687
	45	"																									688
280	50					116					100																700
	50					100																					715
Charge #89	7.10	200	156	155	153	155	156	158	155	155	156	158	156	156	156	155	154	157	154	155	156	155	154	155	156		
Offset (23-07)	14	"	162	162	162	163	161	161	161	163	162	164	162	162	162	168	159	161	163	159	161	163	160	162	162		
	30	"	164	165	164	165	163	164	163	165	164	166	164	164	164	163	162	162	165	163	163	163	162	163	164		
X-5 lines	30	"	166	166	166	166	165	165	166	166	166	166	166	166	166	164	164	166	167	165	166	165	164	164	166		
	50	"	165	165	165	167	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165		
	8.10	"	169	169	169	170	169	169	168	171	169	170	169	170	170	168	167	168	169	167	168	168	167	167	168		
	30	"	169	168	168	170	168	168	168	171	169	170	169	169	169	168	167	167	168	166	168	167	168	168	167		
	50	"	168	168	168	170	167	168	167	170	169	169	168	169	169	167	167	166	167	166	168	167	167	167	166		
	9.10	"	168	168	168	170	167	168	167	170	169	169	168	168	168	167	166	166	167	166	167	167	167	166	166		
	30	"	168	167	168	170	167	168	167	170	168	169	168	168	168	166	166	167	166	167	167	167	166	167	166		
	50	"	168	167	168	170	168	168	167	170	168	169	168	168	168	166	166	168	166	167	166	167	167	167	166		
	10.10	"	168	167	168	168	167	168	167	172	168	169	168	168	169	167	166	166	166	168	167	167	167	167	166		
	30	"	168	168	169	169	168	168	168	170	168	169	169	169	169	166	167	168	167	168	167	168	168	168	167		
	50	"	168	168	169	169	168	169	169	172	168	169	169	169	170	168	169	168	167	168	167	168	168	168	167		
	11.10	"	169	169	170	169	169	169	170	171	169	170	169	169	170	169	168	169	168	169	168	169	169	169	168		
	30	"	170	169	170	170	170	170	170	172	169	171	170	170	171	169	169	169	168	169	169	169	169	169	169		
	50	"	170	169	170	170	170	170	170	172	169	171	170	170	171	170	169	169	169	170	170	169	169	169	169		
5 hrs.	12.10	"	171	170	171	170	170	170	170	172	170	171	170	172	172	170	170	170	169	170	170	170	170	170	170		
Discharge #87	12.15	150	149	149	149	149	149	149	149	148	148	147	148	148	148	148	147	148	149	149	149	149	149	149	148		

Tuesday Aps 7 3rd 07

#123/07

X-5 lms 1

Time	Amp	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
1.19	150	144	143	144	143	144	144	144	144	145	144	143	143	143	143	144	144	144	145	145	144	144	145	144	145	145	144	144	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	143	
.25	"	141	140	141	140	142	141	142	142	140	140	141	140	140	140	141	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	
1.35	"	139	138	139	135	139	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	
1.55	"	136	134	136	133	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	
2.15	"	133	132	134	130	134	133	134	134	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	
2.35	"	131	132	132	129	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	
2.55	"	130	130	131	127	131	131	131	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	
3.15	"	129	128	129	127	130	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	
3.35	"	128	127	128	125	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	128	
3.55	"	127	126	128	124	128	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	
4.15	"	126	124	127	123	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	
4.35	"	125	123	125	122	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	
4.55	"	123	122	124	121	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	
5.15	"	121	119	122	119	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	122	
.25	"	120		120		119	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	
.35	"	115		115		118	118	100	119	117	117	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	
.45	"																																																																											
.55	"																																																																											
5.01	"																																																																											

5413-15 used for special tests at temperatures above normal.
See Temperature Test book.
Others sent back to Hooper. 4/27/07.

Time	Vacuum	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051
Charge #142 6/6/07	5:00	150													
	1:40	"	-	-	-	-	-	-	-	-	-	-	-	-	-
Discharge #142 6/6/07 Jan.	1:45	150	149	149	149	149	148	149	149	144	143	142	142	142	142
	:49	"	143	144	142	136	144	142	144	138	144	142	143	144	144
	:55	"	141	142	140	133	141	141	141	135	141	138	140	140	137
	1:05	"	139	139	139	130	139	139	139	133	139	136	138	138	135
	:15	"	137	138	137	126	137	137	137	131	138	136	137	137	133
	:25	"	135	136	135	121	136	136	136	129	136	132	134	135	131
60	:45	"	133	134	132	115	134	133	134	127	134	129	132	134	129
	1:05	"	131	132	131	112	132	132	132	127	132	127	132	132	127
	:25	"	130	131	129	110	130	130	131	126	131	126	128	129	126
120	:45	"	129	130	129	108	130	129	130	125	130	125	128	129	125
100	2:05	"	128	129	128	106	128	128	128	124	129	124	127	127	124
	:25	"	127	128	(4)	104	(2)	127	127	123	127	123	126	126	123
110	:45	"	126	127	126	103	126	126	126	122	127	122	125	125	122
	3:00	"				100									
	:05	"	125	125	125		125	125	125	121	124	120	123	123	120
	:25	"	123	124	123		124	123	124	120	124	118	122	122	119
	:35	"	123	123	123		122	122	123	119	123	117	121	121	118
	:45	"	122	122	122		122	122	122	118	123	116	120	120	116
	:55	"	120	120	120		120	120	121	116	122	109	118	119	114
	4:08											100			

Time	Vacuum	1054	1055	1056	1057	1058	1059	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112
Charge 6 2/3 hr.																				
		147	147	147	147	147	146	146	146	146	146	146	146	146	146	146	146	146	146	146
		144	144	142	143	143	144	144	144	144	143	141	142	142	142	142	142	142	142	142
		141	138	140	140	137	142	143	140	138	142	142	140	140	140	140	140	140	140	140
		139	136	138	138	135	139	140	137	136	139	139	137	137	137	137	137	137	137	137
		138	132	136	137	133	138	138	136	134	137	137	135	135	135	135	135	135	135	135
		136	132	134	135	131	136	137	134	130	134	134	132	132	132	132	132	132	132	132
		134	129	132	132	129	134	135	132	127	132	132	130	130	130	130	130	130	130	130
		132	128	130	131	127	132	134	130	124	130	130	128	128	128	128	128	128	128	128
		131	126	128	129	126	131	132	129	122	129	129	127	127	127	127	127	127	127	127
		130	125	128	128	125	128	131	128	121	128	128	126	126	126	126	126	126	126	126
		129	124	127	127	124	129	130	127	120	127	127	125	125	125	125	125	125	125	125
		127	123	126	126	123	128	129	126	119	126	126	124	124	124	124	124	124	124	124
		127	122	125	125	122	127	128	125	118	125	125	123	123	123	123	123	123	123	123
		124	120	123	123	120	126	126	124	117	124	124	122	122	122	122	122	122	122	122
		124	118	122	122	118	124	125	123	115	123	123	121	121	121	121	121	121	121	121
		123	117	121	121	118	124	124	122	114	122	122	120	120	120	120	120	120	120	120
		123	116	120	120	116	123	123	121	112	121	121	119	119	119	119	119	119	119	119
		122	109	118	119	114	120	121	120	110	120	120	118	118	118	118	118	118	118	118
			100																	

5413-15 used for temperature tests

646

	Time	Chg.	1000	1045	1100	1115	1130	1145	1200	1215	1230	1245	1300	1315	1330	1345	1400	1415	1430	1445	1500	1515	1530	1545	1600	1615	1630	1645	1700	1715	1730	1745	1800	1815	1830	1845	1900	1915	1930	1945	2000	2015	2030	2045	2100	2115	2130	2145	2200	2215	2230	2245	2300	2315	2330	2345	2400	
260	1:05	150	119	119	119		118	118																																																					
	10																																																													
	12	"		100				100																																																						
	13	"																																																													
	14	"																																																													
270	15	"	116		118			98																																																							
	22	"	100		100																																																										
	22½	"																																																													
	23	"																																																													
280	25	"																																																													
	27½	"																																																													
	28	"																																																													
	31½	"																																																													
	5:05	150	150	154	155	156	156	156																																																						
	09	"	155	159	160	162	162	160																																																						
	15	"	163	163	163	163	162	162																																																						
	25	"	163	164	165	165	164	164																																																						
	45	"	166	166	165	166	166	166																																																						
	5:05	"	168	167	165	167	167	168																																																						
	15	"	168	168	170	169	168	168																																																						
	25	"	169	168	170	167	168	169																																																						
	35	"	168	168	169	168	168	168																																																						
	45	"	168	168	169	169	168	168																																																						
	6:05	"	168	167	169	170	168	168																																																						
	25	"	168	167	169	170	168	168																																																						
	45	"	168	167	169	170	168	168																																																						
	7:05	"	168	167	169	170	168	168																																																						
	25	"	168	168	170	170	168	168																																																						
	45	"	168	167	170	170	167	168																																																						
	8:05	"	168	167	170	170	168	168																																																						
	25	"	168	167	169	170	168	168																																																						
	45	"	168	167	169	170	168	168																																																						
	9:05	"	168	167	169	170	167	168																																																						
	25	"	168	168	170	170	168	168																																																						
	45	"	168	167	170	170	167	168																																																						
	10:05	"	168	167	170	170	167	168																																																						

Chang. Th. 143

X - 6 2/3 Q 150

2/6/3 [illegible]

Discharge 143

6/7/07

Jmb

X = 6 2/3 @ 150

Time	Air	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
1025	150	168	167	170	170	167	168	168	170	169	170	168	169	170	167	167	168	171	167	168	167	168	
45	"	168	168	170	170	167	168	168	170	169	170	168	169	171	168	167	168	171	166	168	167	168	
11 05	"	168	167	170	170	167	168	168	170	169	170	168	169	171	168	167	168	171	166	169	168	168	
25	"	168	168	171	170	166	168	168	169	169	170	168	169	171	168	167	168	171	166	169	168	168	
45	"	168	168	170	170	166	168	168	169	169	170	168	169	171	168	167	168	171	166	168	168	168	
11 50	150	149	149	147	148	149	149	149	148	149	147	147	147	141	149	149	147	146	149	149	149	149	
53	"	143	144	141	141	143	144	144	142	144	141	142	142	136	143	144	142	141	144	144	144	144	
1200	"	141	142	139	139	142	142	142	140	142	138	140	141	134	142	142	140	139	142	142	142	142	
10	"	139	140	137	136	139	140	140	137	139	136	138	139	132	140	141	137	135	140	140	140	140	
20	"	137	138	135	134	138	138	138	135	138	134	136	137	130	138	139	136	133	138	138	138	138	
30	"	136	137	134	132	136	136	136	133	137	132	134	136	128	136	138	134	131	137	137	137	137	
50	"	134	135	132	130	134	134	134	131	134	130	132	133	126	134	136	132	127	134	135	135	135	
1 10	"	132	133	130	128	132	132	132	130	133	128	130	131	124	132	134	130	126	134	133	133	133	
30	"	130	131	129	126	131	131	131	128	131	126	128	130	123	131	133	128	122	132	132	132	132	
51	"	130	130	127	124	130	130	130	125	130	125	127	128	123	130	132	127	118	131	131	131	131	
2 10	"	128	129	127	122	128	128	128	125	129	124	126	128	122	129	131	126	114	130	130	130	130	
30	"	127	128	125	118	127	127	128	124	128	123	125	126	121	128	129	124	110	129	129	129	129	
50	"	126	127	125	113	126	126	127	123	127	122	124	125	120	127	128	124	107	126	128	128	128	
3 10	"	125	125	123	108	124	125	125	121	124	120	123	124	119	126	127	123	104	126	126	126	126	
30	"	124	124	122	106	123	123	124	120	124	119	121	122	118	124	125	123	103	125	125	125	126	
50	"	122	122	120	104	121	121	122	117	122	116	120	120	115	122	123	121	101	123	123	124	124	
57	"																	100					617
4 00	"	121	121	120	103	120	121	122	116	122	114	118	118	113	121	122	120		122	122	123	124	
05											100												637
10	"	120	120	118	102	118	119	120	115	120		117	114	107	119	119	118		120	121	121	122	
14	"													100									660
15	"											100											662
17	"		100																				667
19	"												100										672

240

260

E

	Time	Amps	5398	5399	5400	5401	5402
270	4:20	150	117		115	101	100
	23	"					
	25	"			100	100	
	26.5	"					
	27.5	"					
	28	"	100				
280	30	"					
	32						
	35						
	38						

Time	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
4:20	116	118	113	119	1				115	114	116	1	115	119	119	121	675
23	100												100				682
25																	687
26.5									100	100							691
27.5			100														693
28																	695
30		100		99							97			113	118	118	700
32														100			705
35																00	712
38															100		720

Took 5401 and 5417 apart and cleaned contacts of grid with nuts; with fine emery cloth. Contacts had the same reddish brown coating as the outside of the tube.

Charge #144
6-8-507

Time	Amps	5398	5399	5400	5401	5402
12.30	150	150	151	153	138	155
.34	"	159	158	169	144	159
.40	"	162	162	161	161	162
.50	"	164	163^{7}	164^{2}	134	164
1.10	"	166	165^{5}	166	158	165^{2}
.30	"	168	167^{2}	168	164	167
.50	"	168	168	169	166	166
2.10	"	168	168	168	167	168
.30	"	167	167	168	168	168
.50	"	167	167	168	167^{7}	168
3.10	"	167^{2}	167	167^{7}	168	167^{5}
.30	"	167^{5}	167	168	168^{2}	167^{2}
.50	"	167^{5}	167	168	168^{2}	167
4.10	"	167^{5}	167	168	168	160^{7}
.30	"	167^{5}	167	168	168^{2}	167

Time	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421
12.30	155	155	158	154^{2}	158	156	156	158	166	155	156	146	156	156	154	155
.34	154	159	158^{2}	158	163	158	162	161	159	158	160	150^{5}	157	159	158^{2}	158
.40	162	162	165	161^{5}	165	163	162	165	163	162	163	153	162	162	161^{5}	161^{2}
.50	164	163	167	163	166	164^{2}	164	166^{2}	164	163^{7}	164	156	162^{2}	164	163	163
1.10	166	164^{2}	169^{2}	165	168	166	166	168	16.5	165^{2}	166	162	164^{5}	166^{2}	165^{7}	164^{2}
.30	167	166^{2}	171	167	170^{5}	168	168^{2}	169^{2}	166^{2}	167	167	164	166^{2}	167^{5}	166	166^{5}
.50	168	168	172	168	171^{2}	168	168	168	167	167	168	166	167	167	167	167
2.10	168	168	172	168	171	168^{2}	168	170	168	167	168	167	167	166^{2}	167	166^{2}
.30	168	167^{5}	171	167^{5}	170	169	168	170	167	166	168	168	166	166	166	166
.50	168	167.5	171	167^{5}	170	168	168	170^{5}	167	166	168	168	166	166	166	166
3.10	167^{5}	167.5	170^{5}	167^{7}	170	168.5	168	170^{7}	166^{7}	166	167^{7}	168^{2}	165^{7}	166	165^{5}	165^{7}
.30	167^{7}	167^{5}	170^{2}	167^{5}	170	168^{2}	168	171	166^{5}	166	167^{5}	168^{5}	166	166	165^{5}	165^{5}
.50	168	167^{5}	170	168	170	168	168	171	166^{2}	166	168	169	166	166	166	165
4.10	168	167	170	168	170	168	168	171	166^{2}	166	168	169	166	166	166	163
.30	168	167^{2}	170	168	170	168^{2}	168	171	166^{2}	166	168	169	168	166	166	165^{2}

	Time	Amps	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
	4.50	150	167.5	167	168	168^2	167	168	167.5	170	168	170	168	168	171	166^2	166	168	169	166	166	166	165^5	
5 hrs.	5.10	"	167^2	167	168	168	166^7	168	167^2	170	168	170^2	168^2	168	171	166^2	166	168^5	169^2	166	166	166	165^2	
	30	"	167^5	169	168	168^5	167^2	168	167.5	170	168^2	170	168^2	168^2	171^2	166^2	166	168^2	169	166	166^2	166^5	165	
Discharge #144	5.35	150	149	149	147	144	148	147	148	146	148	144	144	146	140	146	146	144	141	148	147	147^7	147	
6-8-07	39	"	144	144	143	140	144	144	144	141.5	144	140	141	143	135	143^5	145	141	138	145	144	145	144	
~~A4~~	45	"	141	142	140	136	142	140	141	138	141^2	138	138^2	140^2	133	141	143	138	134	142	142	142	142	
+ Jun.	55	"	138	139^2	138	133	139	138	138	135	139	134^2	136	138	130	138	140	135	129	140	139^5	140	139	
	6.15	"	135	136	134^5	128	136	135	133^7	132	136	131	131	135	126	135	137	131	114	136	136	138	136	
60	35	"	134	134^5	133	124	134	134	134	130	134	129	130	133	124	133	135^5	129	109	134^5	134	134	138	
	55	"	130	132^5	130	115	132	132	132	127	132	127	127	131	123	132	134	127	107	133	132	132	132	
	7.15	"	130	131	129^5	108	130	130	130	125	130^5	125	126	129	122	130	132	126	106	131	131	131	131	
1.20	35	"	128	129	127	107	128	128	128^5	125^5	129	123	124	128	121	128^5	131	124	105	130	130	130	130	
	55	"	126	127^5	126	106	126	126	127	121	127	121	123	126	120	127	125	123	103	128	128	128	128	
	8.15	"	125	126	124	104^2	125	125	125	120	126	120	121	124	118	126	127	122	103	127	127	127	127	
1.80	35	"	123	124	123	102	122	123	124	116	124	118	118	122	116	124	125	120	102	125	125	125	125	
2.00	55	"	120	121	120	100^2	119	120	122	114	122	114	116	119	113	120	121	118	100^5	123	123	123	123	
	57	"				100													100					505
	9.02	"										100												517
	10	"												100										537
	11	"		100											100									541
	13	"					100									100								545
2.20	15	"	114		108			114	117	110	118		100			109	108	114		118	120	120	120	550
	17	"			100																			555
	18	"	100													100	100							557
	19	"						100																560
	20	"																		100				562
	21	"							98															565
	22	"									100													567
	22?	"								100														568
	24	"																100						572
2.37	26	"																			104	110	100	577
	27																				100			580
	36																					100		587

	Time	Amps	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421
Charge #145	7 30	200	156	168	167	142	160	160	160	164	160	163	164	160	166	160	160	162	143	159	161	160	160
June 10-07	34	"	167	166	171	154	167	167	166	171	166	170	170	167	175	166	166	168	169	165	167	166	166
[illegible]	40	"	169	168	173	155	168	169	168	173	168	172	170	169	176	168	167	170	172	167	168	167	167
	50	"	171	170	175	161	170	171	170	175	170	174	173	171	178	169	170	172	170	169	171	170	170
	8 10	"	172	171	176	166	172	172	171	176	172	175	174	173	179	171	171	173	167	170	171	171	170
	30	"	172	172	176	170	173	173	172	176	172	175	175	172	179	172	170	174	168	170	170	170	170
	50	"	172	171	176	171	172	172	172	176	171	174	175	172	179	172	170	174	170	170	170	170	170
	9 10	"	171	171	175	172	172	172	171	176	171	175	174	171	178	171	169	174	171	170	170	170	170
	30	"	171	170	174	172	171	171	171	176	170	174	174	171	177	171	169	174	172	169	169	169	169
	50	"	170	170	175	172	170	171	170	175	170	174	173	171	177	170	169	173	172	169	169	169	169
	10 10	"	170	170	174	171	170	171	170	175	170	174	172	171	176	169	168	172	172	169	169	169	169
	30	"	170	170	175	171	170	172	170	174	171	174	172	172	176	170	168	173	172	169	169	169	168
	50	"	170	170	176	171	169	172	170	175	171	174	172	172	176	169	169	172	172	169	170	169	169
	11 10	"	172	170	176	171	170	172	171	174	172	173	172	172	176	170	169	172	172	169	170	169	169
	30	"	172	170	177	171	170	172	171	173	171	173	171	172	175	170	170	172	172	169	171	170	170
[illegible]	50	"	172	170	176	171	170	171	171	173	172	173	171	172	174	170	170	172	172	169	171	171	170
	12 10	"	172	170	176	171	170	172	172	173	171	173	171	172	175	170	170	172	171	169	172	172	170
	30	"	172	171	176	171	170	172	172	173	171	173	171	172	175	170	170	171	171	169	171	172	170
Discharge #145	12 35	150	150	150	147	147	150	150	150	148	149	145	146	148	144	148	150	146	145	149	150	150	150
9/10/07	39	"	144	144	140	140	144	144	144	142	144	141	142	144	139	143	145	141	140	144	144	140	144
JWW	45	"	142	142	138	138	142	141	142	139	142	138	139	141	137	141	143	139	137	142	142	143	142
	55	"	140	140	136	135	140	139	140	137	140	136	137	139	134	139	141	136	134	140	140	140	140
	1 15	"	137	136	133	131	136	135	136	134	136	133	134	136	131	135	138	132	133	136	136	137	136
60	35	"	134	134	130	128	134	133	133	130	134	130	130	134	131	133	136	129	131	134	134	135	132
	55	"	132	133	128	125	132	132	132	128	132	128	128	132	126	132	134	126	110	134	133	133	133

Time	Pump	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421	
	245	126	130	132	126	125	130	130	130	126	126	126	130	125	130	133	124	127	132	131	132	131	132	131		
1 120	35	"	129	130	125	128	129	129	129	125	125	125	128	124	128	132	122	126	131	130	130	130	130			
	55	"	128	129	124	130	128	128	128	124	128	123	124	127	122	127	130	122	126	128	130	130	130			
	3 05	"	126	127	123	126	126	126	127	122	122	127	121	121	126	121	126	129	120	124	128	128	128			
180	35	"	125	126	123	126	125	125	126	122	124	126	120	121	124	120	127	127	118	124	127	127	127			
	45	"	124	125	122	124	124	124	124	121	124	124	119	119	118	124	126	126	118	123	126	126	126			
200	55	"	124	124	121	123	123	123	124	118	124	118	118	122	118	123	126	116	122	126	126	126	126			
210	4 05	"	122	124	121	122	121	121	122	116	122	116	118	120	116	122	124	113	121	124	124	124	124			
220	15	"	120	121	120	120	120	120	121	115	121	115	117	118	115	119	123	110	120	123	123	123	123			
	24	"																								572
	29	"													100											573
230	35	"	118	119	118		117	118	120	120	120		111	100	111	118	121	108		121	121	121	122			587
	30	"				100																				588
	33	"																								600
240	35	"	118		115		100	116	118	110	119		102	108	108	117	119	107		120	120	120	120			602
	36	"				100									100											612
	20	"																								630
	22	"						100																		632
	24	"																								627
250	45	"										100	103	104	103		104	111	105		112	119	120	121		628
	46	"															100									630
	45	"																	100		90					631
	45	"																100								637
260	55	"																				101	116	113		677
	55	"																				100				655
	57	"																					100	100		662
	300																									

Took tubes 5401 + 5417 out of old grids and cleaned the flattened ends of the tubes with emery paper. Then put up in new grids and assembled as before.

— W.R.G.

6/10/07

	Time	Amp	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5409	5418	5419	5420	5421
Charge #146 6/10/07	6 30	200	156	158	160	139	160	159	163	159	164	164	160	160	166	158	160	158	140	160	160	159	159
	.34	"	164	164	164	143	166	164	164	168	163	169	168	164	171	164	163	165	144	163	164	163	164
	.40	"	167	166	168	149	167	167	166	170	163	170^5	170	167	173	167	166	168	145	165	166	166	166
	.50	"	169	168	169^7	156	168	169	168	173	168	172	172	169	175	168	169^2	169	148	167	168	167	167
X – 5 hrs @ 200	7 10	"	171	170	172	165^5	170^5	171	170	170	170	170	174	171^2	178	171	170	172	156	170	170^2	170	170
	.30	"	171	170^7	172	167^5	171	172	171	170	171	174^2	174	171	178	171^5	170	174	162	170	170	170^2	169^7
	.50	"	170^5	170	172	168	171	171	171	174	170	174	174	171	177	171	169	174	168	169^7	170	170	168
	8 10	"	170^2	170	172	169	170	171	170	174^5	170	173	173	170	176	171	169	174	170	169	169	169	168
	.30	"	170^2	170	172	169	170	171	170	174^5	170	173	173^5	170	176	171	169	174	170	169	169	169	168
	50	"	170^2	169^7	171	169	169	171	170	175	170	174	172	170	176	170	169	174	172	169	169	169	168
	9 20	"	170	170	172	168^2	169	171	170^2	174	170	174	172	172	176	170	168	173	172	169	169	169	160
	30	"	170^2	170	172	169	169	171	171	174	171	173^7	172	172	176	170	168	173	172	169	169	169	168^2
	50	"	171	170	173	169	169^7	172	171	174	171	173^7	171^7	172	176	170	169	172^4	172	169	169^7	169	169^5
	10 11	"	172	170^2	174	169	170	172^2	171	174	171	174	171^5	172^2	176	170	170	172	171	170	170^2	170	170^2
	30	"	172	171	174	169	170	173	172	174	172	173	172	172^2	176	171	171	172	171	170	171^7	171^3	171^7
	57	"	172^2	171	174	168	170	172	172	173	171^7	173^7	171	172	176	171	171	172	171	170	172	172	172
	11 10	"	172	171	173	169	170	172	172	174	171^7	173^7	171^7	172	176	171	171	173	171	170	172	172^2	172
	30	"	172	172	174	169	170	172	172	174	172	174	172	172	176	171	172	172	172	170	173	173	172^2
Discharge #146 6/10/07	11 35	150	150	150	148	143	149	149	150	148	149^5	147	146	148	144	148	150	144	146	149^5	149	149	149
	39	"	145	145	142^5	138	144	145	144^5	142	145	141	142	144	140	144	146	140^2	141^7	145^7	144	145	144^5
	45	"	142	142	141	134	142	142	142	139^5	142	138^4	139^7	142	137	141	143	137	138	143	142	143	142^5
	56	"	139	140	138	130	139	139	139	136	137	135	136	139	134	138	140	133	134	140	139	140	140
X – 5 hrs @ 200	12 05	"	[illegible]8	138	136	125	138	138	138	136	138	134	134	138	132^5	136^5	139	131	132	139	138	138^5	138^5
	15	"	136^5	137	134	119^5	136^5	136	136	133	136^5	132	132	136	131	135	138	130	129	137^5	136	137	137
	35	"	134	135	132	107	134	133	133	130	134	130	129	133	128	132	135	124	125	135	134	135	134^2

	Time	[illegible]	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
	12 55	150	132	133	130	107	132	132	131	127	132	128	127	132	126	130	134	120	118	133	132	133	132	2
	1:15	"	131	132	129	117	130	130	130	126	131	126	125	130	125	129	133	117	110	132	131	132	131	
	35	"	130	131 5	128	105	130	129	130	125	130 5	124 5	124	129	124	128	132	112 5	107	101	130	131	131	
	55	"	128	129	126	104	128	127	128	123	128	123	122	127	122	126	130	110	107	130	129	129 7	129	7
	2:15	"	126	127	125	102	126	126	125	122	127	122	120	126	121	126	129	108	106	129	128	128	128	
	35	"	125	126	124	101	125	125	125	120	124 5	120	118	124	120	124	127	107	106	127	127	127	127	
200	55	"	124	124	122	100	122	122	124	118	124 2	118	124	122	118	122 2	126	104	105	125	125	126	126	550
	3 05	"	122	123	121		121	122	122	116	123	116	112	120	116	122	124	103	104	124	124	125	125	
220	10	"	121	121	120		120	121	121	114	122	109	110	118	115	120	122	102	103	122	123	124	124	
	20	"										100												562
	25	"	120	118	118		117	118	120	112	121		106	110	112	118	120	100	102	122	122	123	123	571
	29	"												100										585
	32	"		100			100						100											592
	34	"																						597
240	35	"	117		119			116	118	110	119				104	116	117		101	120	120	121	122	
	40	"			100																			612
	40 5	"													100									613
	42	"	100					100																617
	44	"								(622)									100	(622)				622
	45	"							98	96	100					99	100			98	118	120	120	625
260	55	"																			101 5	116	106	
	56	"																			100		(652)	652
	57	"																					98	655
	4.02	"																				100		667

Put fresh 21070 KOH in cells #5401 + 5417.

Charge #147
6/12/07

Discharge #147
6/12/07
Jan.

Charge #147

Pat new changed 7 ea in cells 5401 and 5417.

Change #148 6/13/1907

Change #148 6/13/1907

Time	Amps	1st	2nd	3rd	4th
	1205	250	134	125	132
	23	"	132	133	131
	41	"	130	132	129
	1205	"	130	130	128
	.75	"	128	129	126
	43	"	127	127	125
	1.05	"	125	125	123
	.25	"	123	123	122
	.25	"	122	125	121
	.26	"	120	119	118
	43	"	119	121	116
	46	"		100	
	50	"			100
	54	"			
	56	"			
	57	"	100		
	58	"			
	59	"			
	2.00	"			
	03	"			
	09	"			
	13	"			
	15	"			
	18	"			
	25	"			
	31	"			
	35	"			
	37	"			
	3.25	250	161	166	164
	29	"	161	162	162
	.35	"	170	170	170
	.45	"	172	178	176
	4.05	"	172	173	177
	.25	"	174	174	174
	45	"	174	174	174
	5.05	"	171	171	176

charge # 149
6/15-1907
[illegible]

X-4 On @ 250

Time	Amps	1st	2nd	3rd	4th
	130	134	134	134	134
	27	132	132	132	132
	28	132	132	132	132
	29	128	128	128	128
	30	126	126	126	126
	32	125	125	125	125
	33	123	123	123	123
	34	122	122	122	122
	35	120	120	120	120
	36	118	118	118	118
	37	116	116	116	116
	38	114	114	114	114
	39	112	112	112	112
	40	110	110	110	110
	41	108	108	108	108
	42	106	106	106	106
	43	104	104	104	104
	44	102	102	102	102
	45	100	100	100	100
	46	98	98	98	98
	47	96	96	96	96
	48	94	94	94	94
	49	92	92	92	92
	50	90	90	90	90
	51	88	88	88	88
	52	86	86	86	86
	53	84	84	84	84
	54	82	82	82	82
	55	80	80	80	80
	56	78	78	78	78
	57	76	76	76	76
	58	74	74	74	74
	59	72	72	72	72
	2.00	70	70	70	70
	01	68	68	68	68
	02	66	66	66	66
	03	64	64	64	64
	04	62	62	62	62
	05	60	60	60	60
	06	58	58	58	58
	07	56	56	56	56
	08	54	54	54	54
	09	52	52	52	52
	10	50	50	50	50
	11	48	48	48	48
	12	46	46	46	46
	13	44	44	44	44
	14	42	42	42	42
	15	40	40	40	40
	16	38	38	38	38
	17	36	36	36	36
	18	34	34	34	34
	19	32	32	32	32
	20	30	30	30	30
	21	28	28	28	28
	22	26	26	26	26
	23	24	24	24	24
	24	22	22	22	22
	25	20	20	20	20
	26	18	18	18	18
	27	16	16	16	16
	28	14	14	14	14
	29	12	12	12	12
	30	10	10	10	10
	31	8	8	8	8
	32	6	6	6	6
	33	4	4	4	4
	34	2	2	2	2
	35	0	0	0	0
	36	98	98	98	98
	37	96	96	96	96
	38	94	94	94	94
	39	92	92	92	92
	40	90	90	90	90
	41	88	88	88	88
	42	86	86	86	86
	43	84	84	84	84
	44	82	82	82	82
	45	80	80	80	80
	46	78	78	78	78
	47	76	76	76	76
	48	74	74	74	74
	49	72	72	72	72
	50	70	70	70	70
	51	68	68	68	68
	52	66	66	66	66
	53	64	64	64	64
	54	62	62	62	62
	55	60	60	60	60
	56	58	58	58	58
	57	56	56	56	56
	58	54	54	54	54
	59	52	52	52	52
	3.00	50	50	50	50
	01	48	48	48	48
	02	46	46	46	46
	03	44	44	44	44
	04	42	42	42	42
	05	40	40	40	40
	06	38	38	38	38
	07	36	36	36	36
	08	34	34	34	34
	09	32	32	32	32
	10	30	30	30	30
	11	28	28	28	28
	12	26	26	26	26
	13	24	24	24	24
	14	22	22	22	22
	15	20	20	20	20
	16	18	18	18	18
	17	16	16	16	16
	18	14	14	14	14
	19	12	12	12	12
	20	10	10	10	10
	21	8	8	8	8
	22	6	6	6	6
	23	4	4	4	4
	24	2	2	2	2
	25	0	0	0	0
	26	98	98	98	98
	27	96	96	96	96
	28	94	94	94	94
	29	92	92	92	92
	30	90	90	90	90
	31	88	88	88	88
	32	86	86	86	86
	33	84	84	84	84
	34	82	82	82	82
	35	80	80	80	80
	36	78	78	78	78
	37	76	76	76	76
	38	74	74	74	74
	39	72	72	72	72
	40	70	70	70	70
	41	68	68	68	68
	42	66	66	66	66
	43	64	64	64	64
	44	62	62	62	62
	45	60	60	60	60
	46	58	58	58	58
	47	56	56	56	56
	48	54	54	54	54
	49	52	52	52	52
	50	50	50	50	50
	51	48	48	48	48
	52	46	46	46	46
	53	44	44	44	44
	54	42	42	42	42
	55	40	40	40	40
	56	38	38	38	38
	57	36	36	36	36
	58	34	34	34	34
	59	32	32	32	32
	4.00	30	30	30	30

	Time	Amp	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
	5.25	250	171²	171	175²	165	171²	173	172	169	172	178	17x	172	179²	172	170	170	163	170	170	173	169	
	6.05	〃	173	171²	180	165	171²	173	173²	169²	172	175	173	174	179²	173	172	172	164	170	172	171	171	
	.25	〃	174	172	180⁵	166	172²	173²	173	168	172²	166	173	174	179	174	173	172²	164	171	174	174	173	
4 hrs	.45	〃	174	172²	179	166	173	173	173	168	172	165	172²	17[illegible]	177	174	173	172	164	171	174	175	173	
	7.05	〃	173²	173	178	166²	172	173	173	168	172	175	172	173	179	174	173	171	164	171	174	175	173	
	.25	〃	174	173	178	167	173	173	173	168	172⁵	175	172	173	179	174	173	171⁵	164	171	174	175	173	
Discharge #149	7.30	150	150	150	148	148	149	148	149	140	149	147	147	148	144	146	150	143	144	149	149	149	149	
6/15/07	.34	〃	144	144	140	136	144	143	144	136	144	140	142	144	139	144	145	137	138	144	144	145	144	
[initials]	.40	〃	142	142	139	135	142	141	141	132	141	139	140	142	137	141	143	135	135	141	142	143	142	
	.50	〃	140	140	137	133	140	139	140	128	140	138	137	146	135	140	140	131	133	140	140	140	140	
X – 4 hrs @ 250	8.00	〃	138	139	134	131	138	137	138	126	138	134	135	138	133	137	140	127	132	139	139	140	138	
	10	〃	137	137	133	130	137	135	136	122	136	133	133	136	131	135	137	122	130	137	137	138	137	
60	30	〃	134	135	130	129	134	132	134	118	134	130	129	134	129	133	136	110	129	135	134	135	134	
	50	〃	132	134	129	128	132	131	132	115	132	128	128	132	127	132	134	108	128	134	133	134	133	
	9.10	〃	131	132	127	127	131	129	130	113	131	126	126	130	126	130	133	110	128	132	132	133	132	
	21	〃	130	132	127	127	130	129	130	112	130	126	125	130	125	129	132	109⁷	128	132	131	132	131	
120	30	〃	130	131	126	126²	130	128	130	112	130	125	124	129	125	128	132	109⁵	127	131	130	131	130	
	40	〃	128	129	125	126	128	127	128	109	129	124	123	127	123	127	131	109	127	130	129.7	130	129.5	
	50		128	128⁵	125	126	127	126⁵	127⁵	108	128⁵	123⁵	122	126⁵	122⁵	126⁵	130⁵	109	126	129	129	129	129	
	10.00	〃	128	128	124	125	127	126	127	107	128	123	121	126	122	126	130	108	126	129	129	129	129	
	10	〃	126	127²	123	124²	126	125	126²	106	127	122	120	125⁵	122	126	129	108	126	127⁵	128	129	128	
	20	〃	126	126²	122²	124	125	124	126	105	126	121	119	125	121	125	128	107⁷	125	128	127	128	127	
180	30	〃	125	125²	122	123	124	123	125	105	125	120	118	123	120	124	127	107	124	127	127	127	127	
	40	〃	124	124	120²	122	123	122	124	103	124	118	115	121	119	123	129	107	124	126	126	126	126	
200	50	〃	122²	123	122	121	121	121	123	102	123	101	112	119	118	122	124	106	122	125	125	126	125	592
	51	〃										100												
	58	〃												100										521
	11.00	〃	120	120	118	120	119	119	121	100	122		109		116	120	124	105	121	124	124	124	124	542
	07	〃		100																				
220	10	〃	118		113	118	101	116	120		120		100		114	118	122	104	119	122	122	123	123	550
	11	〃					100																	552
	13	〃			100																			558
	17	〃	100																					567
	18	〃						100																
230	20	〃				116²			113		111				106	115	118	102	117	120	120	122	122	570
	22	〃									100													580

	Time	Amp	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
	1122.5	150							100															581
2 35	25	"													100									587
2 40	30	"				110										1.00	11.0	10.0	114	10.0	117	120	120	600
	35	"				100																		612
	39	"															100							622
	40	"																	105		102	109	100	625
	41	"																			100			628
	45	"																	100			100		637
Charge #150	7.55	3.00																						
6/17/07	11.15	"																						
Discharge #150	11:20	150	150	150	149	143	149	148	147	146	149	146	147	148	144	148	149	145	144	149	149	149	149	
6/17/07	24	"	144	145	143	137	144	143	144	141	144	141	142	144	139	144	145	140	138	146	145	145	144	
	30	"	142	142	141	134	142	141	142	137	142	139	140	141	137	142	143	137	135	143	142	143	142	
	40	"	140	140	139	132	140	139	140	135	140	137	137	140	135	140	140	134	133	141	141	141	141	
	50	"	138	139	137	131	138	137.5	137	133	136.5	135	135	139	133	137	139	132	131.5	139	138.5	139	139	
	1200	"	137	138	136	130	137	136	136	131	135	133	133	137	132	136	138	129	131	138	137	138	137	
	10	"	136	137	135	130	136	134	135	129	136	132	132	135	131	135	137	127	130	137	136	137	136	
60	20	"	134	135	134	129	135	133	134	128	134	131	130	134	129	134	126	124	130	136	135	136	135	
	40	"	133	134	132	128	132	131	132	126	133	129	128	133	129	132	135	115	129	134	133	134	133	
	100	"	132	132	130	127	131	130	131	124	131	127	127	131	126	130	133	110	128	132	132	132	132	
120	20	"	130.5	130.5	129	126	129	128	129	118	130	125.5	125	129	124	128	132	111	129	131	130	131	130	
	40	"	129	129	128	125	128	127	128	113	129	124	123	127	123	128	131	111	127	130	130	130	130	
	200	"	127	127	126	124	126	125	127	120	127	122	121	125	122	126	130	111	125	129	128	129	129	
180	20	"	125	125	124	122	123	122	124	105	125	118	118	122	120	124	127	110	124	127	126	127	127	475
	30	"	123	124	123	122	122	122	124	104	124	100	115	120	119	124	126	110	123	126	126	126	126	497
	39	"												100										
200	40	"	122	121	121	121	120	120	122	103	123		113		117	122	125	109	122	125	125	126	125	
	49	"					100																	522
210	50	"	120	100	118	119		117	120	101	121		106		114	120	122	107	120	123	124	124	124	530
	53	"											100											532
	58		100		99			100		100														545

n Change off 31/0 hrs.

	Time	Amps	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
220	300	150				117			117		117				110	116	120	106	118	122	120	127	120	
	07	"							100		100													567
	08	"													100									570
230	10	"				109										105	113	102	113	100	119	120	120	
	12	"																100						580
	14	"														100								585
	14.5	"				106																		586
	17	"															100							592
240	20	"																	106		107	118	106	
	21	"																					100	602
	22	"																			100			605
	25																		100					612
	27																					100		617
Charge # 151	800	300	161	161	164	162	163	164	164	157	164	167	168	163	173	165	162	148	157	161	163	162	163	
6/18/07	.04	"	169	167	170	162	169	171	170	163	169	173	173	169	178	171	167	150	161	166	169	167	167^{5}	
	.10	"	170	169	171	165	170	172	170^{2}	167	170	175	175	171	180	173	169	152^{5}	162	169	170	169	170	
	20	"	172	170	173	167	172	173	172	171^{7}	172	176	176	172	182	174	171	154	164	170	171	171	171^{7}	
	30	"	172^{5}	171	173	168	172^{2}	174	172	174	172	176	176	172	182	174	171	157	165	171	171	171^{2}	171	
	40	"	172	171	173	168	172	174	172^{2}	175	172	176	175	172	182	173^{7}	171	165	165	171	171	171	170	
	9.00	"	171	170^{2}	172	169	171	173	172	176^{2}	172	175	174	172	181	172	170	173	166	170	170	170	170	
	20	"	171	170	172	169	171	172	172	176^{2}	172	175	173	171^{7}	181	172	170	174	166	170	170	170	169	
	40	"	171	170	172	169^{7}	170^{2}	172^{2}	171	176	172	175	173	172	180	172	170	173^{7}	166	170	170	170	169	
	10.00	"	172	170^{2}	173	170	171	173	172	176	172^{2}	175	172	174	180	172	170	172	166	170	170	170	170	
	20	"	173	171	174	170	172	173	172	175	172	176	171	174	180	173	172	172	166	171	172	171	171	
	40	"	174	172	174	170	172^{2}	173	172	175	172	176	171	173	180	173	173	172	167	171	173	174	172^{2}	
	11.00	"	173	172	174	170^{2}	172	173	172	174	172	175	171	172^{2}	180	173	173	171	167	171	174	174	172^{2}	
3 1/3 hrs	20	"	173	172	174	171	172	172^{7}	172	174	172	175	171	172	180^{2}	174	173	171	167	170	173	174	172	
Discharge #151	11.25	150	150	150	148	141	148	147	148	146	148	145	147	148	143	148	149	145	142	148	148	148	148	
6/18/07	24	"	144	145	143	133	144	142^{5}	144	141	144	141	142	144	139	144	146	141	137	145	144	145	144	5
	35	"	142^{5}	143	141^{7}	133	142	140	142	140	142	139	139^{7}	142	137	142	143	140	135	142^{7}	142	143	142	

	Time	Amb	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
	1145	150	140	148	139	130	140	138	139	135	140	127	137	140	135	140	141	134	133	141	141	141	141	
	55	11	139	139	137	130	139	136²	137	133	138	135	135	138	133	137	140	132	131	139	139	140	139	
	1205	11	137	137⁵	136	128	137	135	136	131	137	133	133	137	132	136	138	130	130	138	137	138	137	
60	25	11	135	136	133	126	134	133	134	128	135	131	131	135	129	134	137	128	129	136	135	136	135	
	45	11	133	134	132	125	133	131	132	127	133	129	129	132	127	131	135	125	128	134	133	134	133	3
	1.05	11	132	133	130	125	131	130	131	125	132	128	127	131	126	130²	134	118	128	133	132	133	132	
120	25	11	130	131	129	124	129	127	129	123	130	125	125	129	125	129	133	112	127	132	131	132	131	
	45	11	128	129	127	123	128	126	127	120	128	123	123	127	123	127	131	110	126	130	130	130	130	
	205	11	126	127	125	122	125	124	126	112	127	121	120	124	122	126	129	110	125	128²	128	129	128	
180	25	11	124	125	123	120	122	122	124	107	125	[illegible]	117	124	120	124	127	109	123	127	127	127	126²	
	40	11										100												-487
	44													10.0										-497
200	45	11	120	100	118	118	106	117	121	102	121		111		116	121	124	107	120	125	125	125	125	
	50	11					100																	512
210	55	11	116		100	116		104	119	101	120		100		114	120	122	106	117	124	124	124	124	-525
	58	11						10.0		100														-532
	301	11	100																					-540
	03	11							100															-545
220	05	11			111						100				105	115	119	104	114	122	122	122	122	-550
	07	11													100									-555
	11	11																100						-565
	14	11			10.0																			-573
230	15	11														100	109		103	100	118	120	120	-575
	18	11															10.0		1.0.0					-582
	23	11																					100	-595
	24																				10.0			-597
240	25	11																				110		
	28	11																				100		-607
Charge # 152	800	300	160	161	180	160	160	162	165	160	159	163	168	168	165	170	166	148	162	157	161	162⁵	161	
6/19/07	.04	11	169	167	186	167	169	172	170	164	169	174	173	171	179	171	168	157	164	167	168	164	167	
	10	11	171	170	188	171	171	173	171	171	171	175	176	172	180	173	170	154	164	169	171	166	170	
X-3 1/3 @ 300	20	11	172	171	189	174	172	174	172	175	172	176	176	172	182	175	171	162	166	170	172	169	172	
	30	11	172	171	188	174	172	174	173	176	172	176	176	172	183	174	171	168	167	171	171	169	171	

Time	Amps	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500	4600	4700	4800	4900	5000	5100	5200	5300	5400	5500	5600
8:40	300	172	171	168	175	172	174	173	176	172	176	175	172	182	173	171	171	168	171	171	170	170	170																					
9:00	"	172	171	167	175	171	173	172	177	172	176	174	172	182	172	172	174	168	171	170	170	170																						
20	"	171	171	182	175	172	173	172	177	172	175	174	172	181	172	170	174	169	170	170	170	170																						
40	"	172	171	187	177	172	173	172	176	172	175	173	173	181	172	170	172	169	170	170	170	170																						
1000	"	173	171	188	176	172	174	172	176	172	176	172	174	181	173	172	173	169	171	171	170	170																						
20	"	174	172	190	176	172	174	173	176	173	176	172	174	181	174	174	172	170	171	172	171	172																						
40	"	174	172	190	176	172	174	173	175	173	176	172	174	181	175	174	172	170	171	175	171	174																						
1:00	"	174	173	194	176	174	174	173	175	173	176	172	174	182	175	174	172	170	171	176	171	174																						
20	"	174	173	190	176	173	174	173	174	173	175	172	173	182	175	174	172	170	171	174	171	174																						
11.25	"	150	150	142	142	144	148	148	146	145	146	143	148	144	149	150	146	142	145	145	140	145																						
29	"	145	145	136	137	144	146	144	141	144	141	142	144	139	143	146	140	135	144	146	144	144																						
35	"	142	142	134	134	142	141	141	135	141	139	140	141	137	141	143	137	132	143	142	143	142																						
46	"	140	140	132	131	140	138	139	135	140	137	137	140	134	139	141	135	131	141	141	141	140																						
55	"	132	137	130	129	138	137	137	133	137	135	137	133	137	139	139	133	130	139	139	139	138																						
12:05	"	137	138	128	127	137	135	136	131	136	134	133	131	132	136	138	130	128	138	137	137	137																						
25	"	135	136	126	124	135	132	133	129	134	131	130	134	129	134	135	127	127	136	135	135	134																						
45	"	133	134	124	122	133	131	132	127	133	129	129	132	128	132	130	125	126	135	134	133	133																						
1:05	"	132	133	123	119	131	129	130	125	132	127	127	130	126	130	134	122	125	133	132	132	132																						
25	"	130	131	121	116	130	129	128	124	130	125	125	129	124	129	132	116	125	132	131	131	131																						
45	"	128	129	120	116	128	126	128	121	129	123	123	127	123	127	131	118	124	130	129	129	129																						
2:05	"	127	127	118	115	126	124	126	118	127	121	121	124	122	126	129	118	122	129	129	128	128																						
25	"	124	125	116	114	123	121	124	110	125	116	118	120	120	124	127	108	122	127	127	126	126																						
37	"										100																																	
34	"												100																															
35	"	122	119	114	113	118	120	122	107	124		116		118	133	125	103	121	126	126	125	125																						
40	"	121	110	112	111	114	117	121	105	123		113		116	121	122	107	119	124	124	124	124																						
48	"		100																																									
49	"					100																																						
54	"			100									100																															

Time Amps

190
200

Diaclamp #152
6/19/07

X-3 1/3 @ 300

3/3 hrs.

456
467
507
510
542

Time	Cubic	5.5	5.6	5.7	5.8	5.9	5.10
2.10	2.55	150	115			109	
	.56	"					
	.57	"					
	3.02	"	100				
	04	"				100	
	04½	"					
2.20	05	"					
	07	"					
	13	"					
	14	"					
2.30	15	"					
	19	"					
	23	"					
2.40	25	"					
	27						

Time	5.11	5.12	5.13	5.14	5.15	5.16	5.17	5.18	5.19	5.20	5.21	5.22	5.23	5.24	
2.10	102	119	102	120				113	119	122	105	116	123	123	123	124	527
	100																531
			100														542
		100		100													537
								104	115	118	102	112	121	121	121	122	548
											100						556
								100		100							570
																	572
										128		120	128	117	119	122	575
										110							585
																100	584
														100	108		600
															100		605

Have had 5.0 Hot Run and 4 sig runs in Hoopers room.

Charge # 207 — 5.15 — 300 — Van
7/30/07 — 8.15 — " — [illegible]

Discharge # 207 — 8.20 — 150 — Charge 15 Lbs.
7/31/07

Time	Cubic	5.5	5.6	5.7	5.8	5.9	5.10
	24	"	143	142	141	143	145
	30	"	140	140	138	142	140
	40	"	127	139	135	137	137
	50	"	135	136	134	135	135
	9.00	"	134	134	132	133	135
	10	"	133	133	131	132	132
6.0	20	"	132	132	130	131	132
	40	"	132	132	129	130	131
	100.0	"	131	131	128	129	130
7.0	20	"	130	130	128	128	129

Time	5.11	5.12	5.13	5.14	5.15	5.16	5.17	5.18	5.19	5.20	5.21	5.22	5.23	5.24	
	149	149	149	150	146	149	148	147	150	150	150	149	149	150	146	150	✓
	142	142	142	142	140	142	142	141	144	144	144	143	144	142	142	144	
	139	140	139	140	139	140	139	138	141	141	141	140	141	141	139	141	
	136	137	136	137	135	137	137	136	138	138	138	138	138	139	136	139	
	135	135	134	136	133	135	135	134	136	136	136	136	136	136	134	137	
	133	133	133	134	132	134	133	133	135	135	135	135	135	135	132	136	
	132	132	132	133	130	132	132	132	134	135	134	134	134	134	131	135	
	131	131	131	132	130	132	132	131	134	134	134	133	134	134	130	134	
	130	130	130	132	128	130	130	130	133	133	133	132	133	133	128	133	
	129	130	129	131	128	129	129	129	132	132	132	131	132	132	127	133	
	128	129	128	130	127	129	129	129	131	132	132	130	132	132	127	132	

	Time	Quad	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5413	5414	5415	5416	5417	5418	5419	5420	5421		
240	10:40	117	129	130	127	127	128	127	128	127	128	126	128	128	128	130	131	131	130	131	131	131	130	131	126	131		
	1:00	"	128	129	126	127	128	127	128	127	129	125	127	127	127	130	132	130	129	130	130	130	125	131				
180	20	"	128	128	126	126	127	126	127	126	128	124	127	127	127	129	129	129	128	129	129	129	124	130				
	40	"	127	127	125	125	126	125	126	125	127	124	126	126	126	128	129	128	129	129	129	129	123	129				
	1:00	"	126	126	124	125	126	125	126	125	126	125	126	126	125	127	128	128	127	128	128	128	121	129				
240	20	"	125	126	124	124	125	124	125	124	126	123	125	125	124	127	127	127	126	127	127	127	119	128				
	40	"	125	125	123	124	124	124	125	123	126	122	124	124	124	126	126	126	126	126	126	126	117	126				
	1:00	"	124	124	122	123	124	122	124	122	124	121	124	124	123	125	125	125	124	125	125	126	113	127				
300	20	"	123	123	121	122	123	122	123	121	123	120	123	123	121	123	123	124	123	124	125	110	110	126				
	40	"	121	122	120	120	121	120	122	118	122	118	122	121	120	121	120	122	120	122	122	119	103	124				
	2:00	"	119	120	118	118	119	118	120	118	119	115	120	119	115	116	113	119	115	120	119	103	102	122				
360	.16	"										100															890	
	.20	"	115	116	114	116	116	114	117	114	114		118	113	103	101	100	102	103	114	112	100	119				900	
	27	"														100											902	
	32	"																100									905	
	24	"													100												910	
	245	"																	100								911	
370	30	"	106	105	100	114	111	110	114	112	106		117	107						100	100	105		116			915	
	32	"		100																							930	
	323	"									100																931	
	33	"	100				100							100													932	
	36	"																									940	
	393	"																				100					943	
	395	"						100																			946	
380	40	"				105			104	103			114											107			950	
	42	"								100														100			957	
	43	"																									965	
	46	"				100																					967	
	48	"							100				100														970	

	Time	Amp.	5398	5399	5400	5401	5402	5403	5404	5405	5406	5407	5408	5409	5410	5411	5412	5416	5417	5418	5419	5420	5421	
X Charge #208	5.05	300			On			Charge																
7/31/07	8.05	"				off		— 15 Mins.																
Discharge #208	8.10	150	150	150	148	149	148	149	149	149	149	147	148	148	147	149	150	150	149	149	150	147	150	
8/1/07	14	"	143	144	41	143	142	142	142	143	144	141	142	142	141	143	144	144	143	144	144	142	145	
	20	"	140	140	138	139	139	139	140	140	140	138	139	139	138	140^5	141	141	140	140^5	141	139	141	
	30	"	137	137	135	137	137	136	137	137	137	136	137	137	136	138	138	138	138	138	138^5	136	139	
X = 15 Ins. Chg.	40	"	135	136	134	135	135	134	135	135	136	134	135	135	134	137	137	137	136	137	137	135	137	
	50	"	134	134	132	134	34	133	134	133	134	132	134	134	133	135	135	135	135	136	136	133	136	
60	9.10	"	132	133	130	132	32	131	132	132	133	130	131	132	132	134	134	134	133	134	134	131	135	
	30	"	132	132	129^5	131	131	130	131	131	132	129	131	131	131	133	133	133	133	133	133	130	134	
	50	"	131	131	129	130	130	129	130	130	131	128	130	130	130	132	133	132	132	132^5	132	129^5	133	
120	10.10	"	130	130	128	129	129	129	129	129	130	127	129	129	129	131	132	132	131	132	132	129	132	
	30	"	129	130	127	128	128	128	128	128	130	127	129	128	128	130	131	131	130	131	131	129	131	
	50	"	129	129	126	128	128	127	128	127^5	129	126	128	128	128	130	130	130	130	130	130	127	131	
180	11.10	"	128	128	126	127	127	127	127	126^5	128	125	127	127	127	129	130	130	129	130	130	127	130	
	30	"	127	128	125	126	127	126	127	126	127^5	125	126	127	126	129	129	129	128	129	129	126	129	
	50	"	127	127	124^5	126	126	126	126	126	126	125	126	126	126	128	128	128	127	128	128	126	129	
240	12.10	"	126	126	124	125	126	125	125	124	126	123	125	125	125	126	127	127	126	127	127	125	128	
	30	"	125	125	123	124^5	125	124	125	124	125	123	124^5	125	124	126	126	126	125	126	126	124	127	
	50	"	125	124^5	122	124	124	123	124	123	124	122	124	124	123	125	125	125	124	125	125	123	126^5	
300	1.10	"	122	123	121	122	122	122	123	121	123	120	123	123	121	123	122	123	122	124	124	121	125	
	30	"	121	122	119	120	121	120	122	120	122	119	121	121	119	120	119	121	120	122	122	120	124	
341	51	"	118	119	117	118	118	117	119	117	118	115	119	117	111	114	109	117	113	118	117	116	121	
	2.05	"													100		100							887
	06	"										100												890
	09	"														100								897
	09.5																		100					895

	Time	Reading																													
X	360	2.10	150	113	115	111	114	114	112		116	114	112		117	111						113	104	108	117						
		15	"																		100										
	370	20	"	102	106	100	109	109	100		112	109	100		112	102						100	100	100	112						
		22	"	100																											
		22½	"		100																										
		23	"													100															
		25	"					100																							
		27½	"						100																						
		28	"				100																								
		28½	"									100																			
		29	"								100																				
	380	30	"												110										100						
		40	"												100																

Charge # 209		4.00	150				On																								
8/2/07		10.40	"					Off																							
Discharge # 209		10.45	150	149	147	147	149	147	145		148	148	146	147	147	146	148	149	149	148	148	148	148	143	149						
8/2/07		49	"	143	143	143	141	142	143		142	142	142	142	142	142	142	142	142	142	142	143	142	139	142						
		55	"	141	141	139	140	141	142		141	141	140	138	140	140	140	142	142	142	141	142	142	137	142						
		11.05	"	139	139	137	138	139	138		139	138	140	136	139	138	137	140	140	139	140	140	138	137	140						
		15	"	137	138	136	136	137	138		137	136	138	134	137	137	136	138	139	138	137	138	138	132	139						
		25	"	136	136	134	135	136	135		135	135	136	133	136	135	136	137	137	137	136	137	137	130	137						
		35	"	135	135	133	134	134	133		134	133	135	131	134	134	133	136	136	136	134	136	132	129	137						
	600	45	"	134	134	132	133	133	132		133	132	134	131	133	133	132	135	136	136	133	135	135	127	136						
		1.06	"	133	132	131	131	132	131		132	131	133	129	132	132	131	134	135	134	132	134	134	126	135						
		26	"	131	130	129	130	130	130		130	129	131	127	131	130	130	133	133	133	131	132	133	122	134						
	121	46	"	130	130	129	129	129	129		130	129	131	126	130	130	129	132	132	132	131	132	132	122	132						
		1.05	"	129	129	127	128	128	128		129	128	130	125	128	128	128	131	132	131	127	131	131	120	132						
		25	"	128	128	126	127	127	127		128	127	129	124	127	127	127	130	130	130	129	130	130	117	131						
	180	45	"	127	127	124	126	125	126		127	126	128	122	126	126	126	129	129	129	128	129	129	115	130						

Time	Amp	0530	0540	0550	0600	0610	0620	0630	0640	0650	0700	0710	0720	0730	0740	0750	0800	0810	0820	0830	0840	0850	0900	0910	0920	0930	0940	0950	1000	1010	1020	1030	1040	1050	1100	1110	1120	1130	1140	1150	1200
	2.05	150	122	124	124	123	125	124	125		126	126	127	126	125	125	125	125	128	128	128	127	127	128	128	129															
	2.25	"	123	123	124	124	122	123			124	124	125	127	123	122	122	126	126	126	125	126	127	130	127																
2.40	2.45	"	120	121	117	122	119	121			123	122	123	120	120	119	120	123	124	125	123	123	126	127	126																
	2.55	"	117	119	117	120	116	118			121	120	121		118	115	117	121	122	123	121	122	124	125	125																
	3.00	"	109	115		119	121	114			119	119	119		116	114	112	118	119	121	119	119	123	123	123																
2.60	05	"			100		100										100																								
	06	"																																							
	08	"																																							
	09	"	100																																						
	10	"		100							117	117	114		102		101	114	114	119	115	115	120	100	124																
2.70	15	"				116		107							100		100																								
	17	"									102	118	98																												
	24	"						100			100							104	107	113	109	97	116		118																
2.80	25	"				110												100																							
	26	"																																							
	27	"																	100																						
	32	"				100														100																					
	33	"																			100																				
	34	"																				100																			
2.90	35	"										100											110		110																
	43	"																					100		100																
3.00	45	"																																							
Change # 210 8/2/07	11:00	150	151	150	154	153	152	156			154	154	154	158	155	155	156	154	159	153	159	156	153	157	153																
	.04	"	157	156	158	158	157	159			158	159	157	161	158	158	159	158	156	156	158	156	156	156	157	158															
X = 6 2/3 his. @ 150	.10		160	159	160	160	160	162			160	162	160	162	160	161	161	160	159	158	159	160	158	158	158																
	.20		162	161	162	163	162	162			162	163	162	163	162	162	162	162	161	160	161	160	160	159	160																
	.40		163	163	165	163	163	163			163	165	163	165	163	160	164	165	163	162	162	162	162	157	162																
	1.00		165	164	166	164	165	167			165	167	165	167	165	167	166	164	164	164	163	163	164	162	163																
	.20		166	165	167	166	166	168			166	168	166	168	167	167	167	167	165	165	164	164	163	163	164																
	.40		166	164	167	167	167	168			167	168	166	168	168	167	167	166	166	165	165	165	165	164	165																
	1.00		166	166	167	169	167	168			167	168	167	168	167	167	168	168	166	166	165	165	165	165	165																
	.20		166	166	167	168	167	167			167	168	167	168	167	167	168	167	166	166	166	166	165	165	165																
	.40		166	166	167	168	167	167			168	168	166	168	167	167	168	166	166	166	166	166	166	165	165																
	2.00		166	166	167	168	167	167			167	168	166	168	167	166	166	166	166	167	166	164	164	165																	

Time	Amp	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1050	1055	1100	1105	1110	1115	1120	1125	1130	1135	1140	1145	1150	1155	1200	1205	1210
2.20	150	165	166	166	165	166	167	166	167	166	168	167	165	165	165	167	165	164	166	165	166	165	165	165	167	165	164	165
40	"	166	165	166	167	166	166	166	167	166	167	167	165	165	165	166	165	165	166	166	166	165	165	165	166	165	166	166
3.00	"	166	165	165	167	166	167	166	167	166	167	167	165	165	165	165	165	165	166	166	166	165	165	165	166	165	166	166
20	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	165	165	165	166	166	166	165	165	165	166	165	166	166
40	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	167	165	165	166	166	166	165	165	165	166	165	166	165
4.00	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	167	165	165	166	166	166	165	165	165	166	165	166	165
20	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	167	165	165	166	166	166	165	165	165	166	165	166	165
40	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	167	165	165	166	166	166	165	165	165	166	165	166	165
5.00	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	167	165	165	166	166	166	165	165	165	166	165	166	165
20	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	167	165	165	166	166	166	165	165	165	166	165	166	165
40	"	166	165	165	167	166	166	166	167	166	167	167	165	165	165	167	165	165	166	166	166	165	165	165	166	165	166	165

Discharge 210
8/3/07

X-6 2/3 Dia @ 150

Time	Amp	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1050	1055	1100	1105	1110	1115	1120	1125	1130	1135	1140	1145	1150	1155	1200	1205	1210
.45	150	142	139	146	147	147	147	147	148	148	148	144	145	148	148	148	146	148	148	148	143	144	145	143	142	143	144	144
.49	"	143	144	141	142	143	142	143	143	144	140	143	142	144	145	144	143	144	142	143	144	140	140	139	140	140	140	140
.55	"	141	141	139	140	141	140	141	141	141	138	140	139	142	142	142	140	142	142	138	140	140	140	138	140	139	140	140
6.05	"	139	139	137	138	139	138	139	139	139	136	138	137	140	140	140	138	140	139	136	137	137	137	136	137	137	137	137
.25	"	136	136	134	135	135	135	135	136	136	132	136	133	134	132	138	137	135	137	135	134	134	134	132	134	134	134	134
.45	"	134	134	132	133	132	133	133	133	133	130	135	133	132	136	136	136	135	133	135	134	111	136	132	133	132	133	133
7.05	"	133	132	130	132	132	132	131	132	131	133	128	132	132	134	134	134	132	138	134	134	134	134	134	134	134	134	134
.25	"	131	132	129	129	130	130	130	130	130	128	130	128	133	133	133	133	132	133	133	133	133	133	133	133	133	133	133
.45	"	130	130	128	128	129	128	129	129	129	127	129	127	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132
8.05	"	129	129	127	127	127	127	127	128	127	126	127	126	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131
25	"	127	127	125	125	126	126	126	127	127	125	126	125	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
.45	"	126	126	124	125	125	125	125	126	126	124	125	125	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129
9.05	"	125	124	122	124	124	123	123	125	124	122	123	123	126	127	127	127	127	127	127	127	127	127	127	127	127	127	127
25	"	123	122	119	122	120	121	121	123	122	120	121	120	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
32	"																											

	Time																																	
230	9.36	55	119	120	117	121	117	119																										
	40	"																																
240	45	"	118	119	114	122	115	117																										
250	53	"	123	117	101	118	102	124																										
	56	"			100																													
	58	"																																
	10.00	"					100																											
	01	"	100																															
	04	"		100																														
260	05	"				115		108																										
	10	"						120																										
	11	"																																
	12	"																																
	14	"																																
	16	"																																
270	17	"				108																												
	19	"																																
275	20																																	
	22	"				100																												
280	25	"																																
	26	"																																
	27	"																																

	124	121	123		120	116	119	123	123	124	122	122	124	100	121																			
	121	120	122		119	111	117	121	122	122	121	120	125		122																			
	119	119	119		116	102	109	117	117	120	117	118	121		120																			
						99																												
							100																											
	116	116	114		106			112	107	115	111	113	117		120																			
					100																													
									100																									
										100																								
	104	111	100					100			103	100	104		113																			
	106																																	
											100																							
		100											101		102																			
													100		102																			

Times continued in "Vol. 1 Contd."

August 5, 1907.

[ITEM FOUND IN BOOK]

A 4 #311
After Discharge #4 add the
Bismuth Hydrate you see
in a glass on the bench.
Chg 15 hrs @ 30 regular ok
A 4 #292-294 ok
Charge 15 hrs @ 30 amp regular
A 4 365-367 ok
Charge 15 hrs @ 30 amp regular
Bull Shit Alls
After this run charge 15 hrs
@ 30 regular as before
ok
Als

[ITEM FOUND IN BOOK]

[ON BACK OF PRECEDING PAGE]

George

Notebook, N-07-05-01

Low Capacity 218 Cells.
Reversed at temp. of 130° F. for different times at 5 amps

May 1, 1907.

Cell #	Capacity	Time of Reverse	Capacity after Treatment			Gain
2294	127	2 weeks @ 5 amps.	117	145	151	19 %
2707	77	" "	87	93	93	20 %
3098	90	3 weeks @ 5 amps	116	133	134	48.8 %
3263	47	" "	56	52	53	12.7 "
3277	92	4 weeks @ 5 amps	101	103	102	11 %
3739	71	" "	38	112	146	105 "
5644	91	5 weeks @ 5 amps	93	97	100	10 %
5877	37	" "	83	89	88	138 "
	These two reversed at normal temperature,					
2943	90	3 weeks @ 5 amps	110	103	100	11 %
5541	97	4 " "	113	111	112	15.5 "

Jas # 2995½ + 96½

Endurance Test

	Corp. Runs when New				50 Runs on Hot Test	Changed KOH.
	13	14	15	16		
2995	1972	S.C	1985	2080		
96	1965	2330	2475	2100		

					50 Runs on Hot Test	Changed KOH.
	80	81	82	83		
2995	1490	1385	1372	1417		
96	1747	1690	1700	1675		

		50 Runs on Hot Test	Changed KOH —			
	191			192	194	200
2995	1397			700	690	700
96	1500			985	1175	1075

				Battery Charged + Short Circuited for 5 Minutes.		
	72	73	74	75	76	78	79
2995	555	975	1070	1120	1332	1447	1407
96	975	1240	1425	1500	1770	1832	1745

					Battery Charged + Short Circuited for 5 Minutes.		
	134	135	136	137	138	139	140
2995	970	1010	1100	1100	1355	1385	1412
96	1070	1200	1250	1270	1470	1500	1500

J.A.E. Tubes, Sol^n 4.

May 1, 1907

Average charge and discharge

5876	27 o/o	1.73	1.19
77	"	1.73	1.192
78	"	1.725	1.185
5879	25 o/o	1.725	1.202
80	"	1.722	1.202
81	"	1.72	1.205
5882	23 o/o	1.732	1.217
83	"	1.74	1.205
84	"	1.74	1.207
5885	21 o/o	1.74	1.222
86	"	1.735	1.217
87	"	1.75	1.217
5888	19 o/o	1.755	1.21
89	"	1.755	1.21
90	"	1.74	1.222
5891	17 o/o	1.75	1.235
92	"	1.745	1.23
93	"	1.76	1.225
5894	15 o/o	1.76	1.22
95	"	1.76	1.215
96	"	1.767	1.22
5897	13 o/o	1.77	1.222
98	"	1.77	1.232
99	"	1.767	1.22

May 1, 1907.

Solutions, 27 to 13 o/o.
P.D. on 5 hr. charge @ 200 m-a.
Approximated from curve — not by planimeter.

5/1/07

Tubes. Set #4.

Capacity tubes 1000 m-a-h is put in at different rates.

Discharges are all at 150 milamps.

To get ampere-hour efficiency of any one, point off one place.

			Charge 6⅔ hrs @ 150	Charge 5 hrs @ 200	Charge 4 hrs @ 250	Charge 3⅓ hrs @ 300
5876	270	Ah OH	790	720	700	652
77	"	"	822	742	720	687
78	"	"	785	700	671	625
5879	250	"	842	767	743	702
80	"	"	837	756	721	685
81	"	"	835	756	721	685
5882	230	"	860	782	743	697
83	"	"	820	743	702	668
84	"	"	820	740	702	668
5885	210	"	820	745	700	650
86	"	"	850	775	731	688
87	"	"	838	765	722	688
5888	190	"	857	783	731	691
89	"	"	857	771	715	690
90	"	"	843	775	717	672
5891	170	"	815	722	678	649
92	"	"	862	801	740	700
93	"	"	850	773	712	683
5894	150	"	827	750	700	648
95	"	"	830	807	662	702
96	"	"	832	751	675	637
5897	130	"	850	770	710	675
98	"	"	837	763	700	640
99	"	"	822	751	685	662

5/1/07.

Tubes, Set #1.

Capacity when 1000 m-a-h is put in at different rates.
After 50 Hot Runs.
Discharges @ 150 m-a.
To get ampere-hour efficiency, point off one place.
Total number of runs before this is 80.

	Charged 6 3/4 hrs @ 150	Charged 5 hrs @ 200	Charged 4 hrs @ 250	Charged 3 1/4 hrs @ 300	Charged 5 hrs @ 200 Tubes made before last runs - 3/5/07
5398	723	652	640	595	723
99	700	622	622	562	735
5400	725	660	642	598	723
5401	777	715	700	657	768
02	720	650	640	597	768
03	735	672	655	607	763
5404	716	656	645	610	725
05	757	688	675	632	728
06	706	662	643	600	724
5407	692	632	617	560	697
08	716	640	622	580	725
09	717	650	630	586	740
5410	717	670	667	633	750
11	738	682	681	650	750
12	725	677	673	645	761
5413	708	663	661	633	725
14	715	663	660	630	777
15	723	672	671	645	766
5416	715	658	657	617	747
17	725	675	670	636	758
18	716	666	667	631	749
5419	743	687	685	650	778
20	756	697	695	662	772
21	732	682	677	647	771

5/3/07.

Jules, Set #5.

Capacity when charged @ of time, and discharged @ 200 m-a for different lengths 150 m-a to 1V.

		Charged 2 hrs.				3 hrs.		4 hrs		5 hrs.		6 hrs.		7 hrs. (Missing)	
5997	21g.7H0H	367	382	407	391	581	561	697	691	790	797	882	890	962	937
98	+2gSiOH	360	388	408	391	587	562	700	693	793	798	895	893	963	937
99		362	395	411	396	597	575	722	711	813	822	910	917	987	960
5995	17g.7H0H	362	370	406	370	575	540	687	677	775	778	865	862	930	910
96	+2gSiOH	370	372	408	373	585	542	696	683	780	785	870	867	947	908
97		355	372	406	372	582	541	695	687	777	786	872	872	947	938
5998	13g.7H0H	337	362	398	358	565	495	663	650	743	746	836	830	900	872
99	+2gSiOH	345	351	398	355	561	485	665	645	736	736	828	825	897	878
6000		320	342	392	346	545	475	640	622	712	715	798	797	865	857
6001	21g.7H0H	330	387	421	393	622	575	747	738	837	841	921	942	998	976
02	+2gSiOH	425	387	421	386	598	563	733	720	812	821	898	920	973	972
03		432	392	423	392	598	570	738	735	830	841	916	937	996	980
6004	17g.7H0H	325	362	407	375	593	555	720	708	807	817	897	910	965	952
05	+2gSiOH	386	385	413	386	608	573	760	742	850	861	947	960	1015	1005
06		405	385	418	390	615	574	762	750	856	865	956	970	1030	1015
6007	13g.7H0H	372	380	415	381	607	567	745	730	840	840	925	935	985	970
08	+2gSiOH	375	375	417	381	606	566	745	731	841	842	931	940	997	982
09		375	382	417	382	616	568	760	741	851	857	945	950	1000	985

See on back of this book for incomplete results of tests on all the lots of Jules.

J.E.A.

5/7/07. Cells #440 - 442. Were reversed once a week on hot test by Hooper.

Jes from Tube Cell #441.

Reassembled each Je with four tubes in fresh 21 oz. 7107. Capacity to 1.1V. on overcharge is as follows:

441 A	580	1177	990	1180	1170	21 oz. 7107 + 5 oz. 7107			
441 B	585	1075	975	1260	1175	15 oz. 7107 + 5 oz. 7107			

Cells 20 and 40 to 1 cubic foot.

1210	1275	1480	887	990	980	
885	785	840	577	492	495	

number of runs hot + normal = 794.

Tubes from Cells #440, 441, + 442.

Reassembled with new Jes after 794 runs.

440	565	573	Put in 7107 + 2 oz. 5 oz. 7107	537	482	500		
441	661	668		636	592	602		
442	652	657	15 oz. 7107 + 5 oz. 7107	653	637	663		

475	Reversed tube against com.	500	478	480	
582	16 hrs. @ 300. Rest in same notation	600	597	578	
637		637	645	675	

5/9/07.

Old Tubes #3, 4, 6, + 8.

After 1320 mins, hot and normal.

								Run @ 115°F.	115°F.	115°F.	115°F.				
#3	270	260	Pulm 2190 $KOH + 2gSiO_2$	238	243	241		232	233	250	248	253	331	345	361	371
6	334	337		262	315	328		323	318	338	325	332	380	395	396	401
4	301	297	Pulm 1590 $KOH + 2gSiO_2$	320	337	330		340	339	350	345	345	403	400	413	425
8	350	357		365	395	402		408	415	433	427	450	480	495	496	508

	Run @ 125°F.	125°F	145°F								
3	387	401	415	302	292	300	Pulm 21 KOH	317	342	337	337
6	408	407	417	370	365	375		386	397	397	398
4	437	443	448	367	366	362		387	372	387	372
8	518	525	508	485	490	485		492	502	492	490

5/9/07.

Tables.

Efficiency in Sower
Charged 5 lbs. @ 200 m-a, dis-
Also Capacity on Overcharge

	3m 21 % KOH				
5601	748	737	1155	Average	747
5602	750	747	1157	"	1156.3
5603	758	757	1159		
	3m 18 % KOH				
5601	692	690	1150	Average	696.6
5602	696	697	1162	"	1155.6
5603	705	703	1155		
	3m 15 % KOH				
5601	690	696	1110	Average	703
5602	700	703	1116	"	1112.6
5603	710	711	1112		

NaOH solutions were made
- Comparable concentrations
molecular weights — i.e. —

Concentrations of Alkaloi.
charged @ 150 m-a.
given in red.

	3m 1.5 % NaOH				
5601		801	1210	Average	810
02		825	1230	"	1218
03		805	1215		
	3m 17.8 % NaOH				
5601		797	1171	Average	800
02		805	1187	"	1173
03		798	1163		
	3m 10.7 % NaOH				
5601		775	1157	Average	776.6
02		780	1162	"	1152
03		775	1137		

by Souis Ott from stick Soda.
are figured in ratio of the
KOH = 56, NaOH = 40.

5/9/07.

Sow Capacity 218 Cells.

		Settling				Treatment.									
											Cake removed x only moistened during 24 hr.		After removal trays aging	
*14106	77	Added 10 g. SiOH	92.5	93.5		94.5	93	92	—	97	x 87.5	88	102	102	To Sedimn 5/14/07
14615	81.5	" 20 g. "	114.5	118.5		119	123	124	—	128.5	x 118	109	133.5	131.5	
14626	89	" 30 g. "	122.5	128		131.5	134	134	Settling 21 g. KOH	136.5		139	138.7	138	137
14640	77	" 40 g. "	109.5	113		118	123.5	123		127.5		127.7	131	126.5	130
14642	83	" 50 g. "	117.5	124		126.5	132	131	—	137.5	x 133	132	142.2	139	
2707	82.5	20 g. SiOH) Removed 15	97	97		99	99.5	99	—	97.5					
5644	89.2	40 g. SiOH) lbs. @ 30 m/p. Neutralized solution	117	123		126	130	131.5	21 g. KOH	134.5					
5877	63.7	Settling 18 g. KOH + 75 g. SiOH.	82	90		95	95	95	—	97.5					

To Sedimn 5/14/07

		Present Electrolyte													
14106	Oxygen 2.5 Commercial Bomb	21 g. KOH + 10 g. SiOH	103	104	105	103	Added 100 g. SiOH x 1/10 Sp. Gr. 2.5 Com. Bomb	90	91.5	93.5	91.5	92			
14615		" " 20 g. "	122.5	139	142	143		116.5	122.5	124	122.5	122.5			
14626		21 g. KOH —	143	149	152.5	152		124	131.5	134	131.5	134			
14640		" " —	132.5	139.5	142.5	142		117.5	123	123.5	125	123.5			
14642		21 g. KOH + 50 g. SiOH	142	148.5	154	152.5		122.5	132	133	135	134.5			
2707		21 g. KOH + 20 g. SiOH	89	89.5	94	Reduced 21 g. KOH		92.5	98	98.5					
5644		21 g. KOH —	124.5	131	136			137.5	131	132	C.O.				
5877		13 g. KOH + 75 g. SiOH	74	76	78			80.2	84	80					

Cake 8/17/07

5/9/07.

Sow Capacity Tube Cells for Special Treatment.

*383	680	Put in 21 g. NaOH + 2 g. SiO2.	652	598	560	Now in hot bath at temp. of 145° F.	775	770	767	Now running normal again	640	612	607				
384	592		555	515	498		720	702	675		517	511	537				
385	702		690	632	591		802	800	742		667	647	642				
480	717	Put in 15 g. NaOH + 2 g. SiO2.	677	703	650												
481	570		495	502	502												
Good Tx. 484½	747																
485	513																
486	665																
487	700	Same as 490 + 421.	653	655	618												
488	610		500	525	500												
649	577	Put in 21 g. NaOH activated with SiO2.	292	262	257	Now hot at temp. of 130° F.	420	397	367	Now normal again	297	295	Put in neg. NaOH	342	375	*	
650	530		255	255	242		400	375	370		303	296		385	415		
651	425		315	290	277		440	400	400		313	300	Tube	387	420		
658	695	Set aside 3 days in 21 g. NaOH and activated with SiO2, at temp. of 135° F.	680	705	708	*	* Tubes* given reverse treatment. See results further on in this book.				649 – 651, 658 – 660., + 2455 – 2457						
659	725		713	730	730												
660	695	Then put in 21 g. NaOH	680	705	702												
2455	577	Put in 21 g. NaOH + 2 g. SiO2.	518	493	445	Now in hot bath at temp. of 145° F.	637	615	641	Now normal again	452	425	427				
2456	521		420	387	306		456	430	435		300	252	252	*			
2457	257		175	137	97		157	200	120		75	76	80				
2458	475	Put in 15 g. NaOH activated with SiO2.	390	397	367	395	Now in hot bath at temp. of 145° F.	650	538	Now	407	390	Put in	303	306		
2459	396		346	367	322	305		585	493	normal	337	357	neg. NaOH	253	281		
2460	425		346	363	338	300		500	425	again	300	300	Tube	252	280		
2461	430	Set with 15 g. NaOH activated with SiO2.	337	293	275												
2462	392	Set aside for 3 days at temp. of 100° F., then put in 21 g. NaOH and then neg.	305	295	276												
2463	480		425	410	405												

5/9/07

Good

Capacity and Efficiency before Reversing.

	Hours.	Cap. on Overload	Cap. on Full Load	Efficiencies		
				Volt	Amp-Hour	Watt-Hour
3591	3.5	1465	997	75.6	84.5	63.9
92	"	1340	892	75.2	85	63.9
3607	"	1570	952	75	90.7	68.1
08	"	1495	955	75.8	91	68.9
09	4	1600	1050	76.2	87.5	66.7
10	"	1650	1080	75.4	90	67.8
3659	5	1637	1285	75.8	85.6	64.9
60	"	1575	1215	75.8	85	64.4
3699	4	1425	1037	76.2	86.4	65.9
3700	"	1482	1040	75.9	86.6	65.7
3725	5	1645	1320	75.5	88	66.4
26	"	1542	1275	75.3	85	64
27	"	1500	1277	74.6	85.1	63.5
28	"	1617	1310	76.3	87.3	66.6
3745	"	1780	1237	73.4	82.5	60.6
46	"	1790	1225	73.9	81.6	60.2

Hours.

Capacity and Efficiency after being reversed, against strips on hot-test, 48 hrs. @ 400 m-a.

	Hours.	Cap. on Overload	Cap. on Full Load	Efficiencies		
				Volt	Amp-Hour	Watt-Hour
3591	3.5	1350	850	75.3	80.9	60.9
92	"	1300	830	74.6	79	58.9
3607	"	1595	885	74.6	84.4	62.9
08	"	1590	865	75.4	82.4	62.1
09	4	1530	976	75.8	81.3	61.6
10	"	1595	1000	75.4	83.3	62.8
3659	5	1745	1285	74.8	85.6	64.10
60	"	1700	1215	75.5	81	61.1
3699	4	1315	975	75.1	81.3	61
3700	"	1400	1010	75.1	84.1	63.2
3725	5	1495	1265	75	84.3	63.3
26	"	1375	1207	74.5	80.5	60
27	"	1350	1207	74.4	80.5	59.9
28	"	1315	1220	75.6	81.3	61.4
3745	"	1035	1285	72.1	85.6	61.7
46	"	1330	1265	73.3	84.3	61.8

5/11/07.

Tubes, Sol #5. SiOH Solutions.
Average P.D. of Charge and Dis-charge on 5 hr. chg. @ 200 m-a.
Approximated from Curves.

CELL	ELECTROLYTE		CHARGE	CHARGE
5992	21 g. KOH + 5[illegible] g. SiOH (1.54)		1.737	[illegible]5
93	" " "		1.73	1.26
94	" " "		1.727	1.26
5995	17 g. KOH "		1.745	1.26
96	" " "		1.745	1.26
97	" " "		1.745	1.26
5998	13 g. KOH "		1.76	1.25
99	" " "		1.76	1.25
6000	" " "		1.76	1.252
6001	21 g. NaOH + 2 g. SiOH.		1.76	1.215
02	" " "		1.767	1.205
03	" " "		1.765	1.21
6004	17 g. " "		1.755	1.237
05	" " "		1.757	1.23
06	" " "		1.755	1.232
6007	13 g. " "		1.755	1.245
08	" " "		1.755	1.245
09	" " "		1.755	1.245

5/22/07.

Low Capacity E-27 Cells.
Special Treatment.

First 3 runs, in old electrolyte, app. of which was

	1	2	3	Fresh 21% KOH Cells —	4
*7374	52.5	41.2	41.2	after 4th discharge	75.7
7424	53.2	41.2	45	" 3rd discharge	86.2

	Both cells fully	10	11	12
7374	charged + S.C. increased	117	113.2	111
7424	Solution not changed	110.2	105.7	102.7

E27 *7374 – 1160
" 7424 – 1155

5	Added 45g. SiOH	6	7	8	9
90.7		109.5	109.5	114	111.3
85.5	" " "	103.5	101.2	106.1	102

5/23/07.

Sour Capacity 3.18 Cells.

Fresh KOH put in and a run made by Sadler before receiving.

	Sp.Gr.	1	2	3		4	5	6	7	8	9		35	36
7837	11.40	53	57	57	Add 50 g SiO_2H + made 3 charges at 130° F. — 3 hrs. put in 2 l g. KOH	66	68	70	70.5	71	72		77	75.5
7839	11.40	46	47	47.2	Add 25 g Si_2O_3 + run neg.	69.2	71.5	71.5	71	71.5	72.5		79	76
11475	12.05	51	53	52	3 hr. with 9 l g. KOH + 25 g	77	77.5	82	83.7	82	84		81	84
11497	12.00	46.5	47	46.5	SiO_2H and " " + 50 g.	71	77.5	83.2	85	87.5	88.5		88	92
11506	12.19	47.5	52	51	15 l g. KOH + 25 g. SiO_2H	63	70	72.5	72.5	73.5	76.5		72	75
11514	12.10	38.5	39.5	40.5	" " + 50 g. " "	68	75	81	81.5	83	84		80	86.2
11633	11.94	44	47	46.5	21 l g. KOH + 25 g. SiO_2H	64.5	69.5	72.5	71.2	72.5	72.5		68.5	72.5
11643	12.12	27	29	27	" " + 50 g. "	52.5	60.2	68	68.5	71.5	73.5		74	79
11699	11.85	42	48	48	27 l g. KOH + 25 g. SiO_2H	74	78.5	84	82.5	81	82		83.5	81.5
11751	11.99	41.5	46.5	47.5	" " + 50 g. "	72.5	76.5	80.5	80.5	82.5	85		82.5	88

25 Commercial Runs.

	37	38		63	64	65		91		92	93		144	145	146	147		
7837	77.5	77		74.5	76	75.7		76		78.5	78.5	—	74	75.2	77.5	76.5		Continued further on in Book number 10/21/07.
7839	78.5	77		74.5	76.5	76.5		77		79	80		74.5	76.5	78	78		
11475	88	85		91.2	94.7	95.5		97		99	100		98	101.7	103.2	104.2		
11497	92	93		102.2	104.2	104.7		108.5		109.5	108.5		108.5	109	113.5	112.5		
11506	72.5	73		81	83.7	83.5		84		87.5	87		S.C.	—	—	—		
11514	87	89		91.5	87.5	89		88		92	92		86	91.5	91.5	93.5		
11633	72	71.5		67.5	69.2	69.2		68		68.5	70		69.5	67.2	68	69		
11643	79	82		76	81.2	81.7		83.5		87	88		84.5	87	88.5	90		
11699	79.5	77		72	74.7	74.5		75		78.5	79		72	74.5	75.2	76.7		
11751	90	89		80	87	88.5		86.5		90.5	91		84.7	89	90.5	92.5		

25 Commercial Runs.

50 Commercial Runs.

Data on 3" Tube.

Average of Tubes #5601 - 03.

Total Capacity 1170 m-a-h

Charge 5 hrs. @ 200 m-a.
Discharge @ 150 m-a.
Milliampere-Hour Input 1000
" " Output 768
Average P.D. of Charge (assumed) 1.72
" Discharge " 1.25
Ampere-Hour Efficiency 76.8 %
Watt-Hour " 55.8 %

Charge 6 hrs. @ 200 m-a.
Discharge @ 150 m-a.
Milliampere-Hour Input 1200
" " Output 862
Average P.D. of Charge (assumed) 1.72
" Discharge " 1.25
Ampere-Hour Efficiency 71.8 %
Watt-Hour " 52.2 %

Preliminary Calculations of 4.1 inch Tube.

From 5601-03. Made according to Length.

Total Capacity 1600 m-a-h

Charge 5 hrs. @ 273.3 m-a	
Discharge @ 205 "	
Milliampere-Hour Input	1366
" " " Output	1049
Av. P.D. of Charge (assumed)	1.72
" Discharge "	1.25
Ampere-Hour Efficiency	76.8 o/o
Watt-Hour "	55.8 o/o

Charge 6 hrs. @ 273.3 m-a.	
Discharge @ 205 m-a.	
Milliampere-Hour Input	1640
" " " Output	1178
Av. P.D. of Charge (assumed)	1.72
" Discharge "	1.25
Ampere-Hour Efficiency	71.8 o/o
Watt-Hour "	52.2 o/o

Preliminary Calculations of Nine Plate Tube Cell.
Containing 120 4.1" Tubes.

Total Capacity 192 A-H.

Charge 5 hrs. @ 32.8 amps.
Discharge @ 24.6 amps.

Ampere-Hour Input	164
" " Output	126
Watt-Hour "	157
Av. P.D. of Charge (assumed)	1.72
" Discharge "	1.25
Ampere-Hour Efficiency	76.8 o/o
Watt-Hour "	55.8 o/o
Weight of Cell (assumed)	~~12~~ lbs.
Watt-Hours per Pound	~~13~~
" " available	
by long Charging	~~20~~

Charge 6 hrs. @ 32.8 amps.
Discharge @ 24.6 amps.

Ampere-Hour Input	197
" " Output	141
Watt-Hour "	176.6
Av. P.D. of Charge (assumed)	1.72
" Discharge "	1.25
Ampere-Hour Efficiency	71.8 o/o
Watt-Hour "	52.2 o/o
Weight of Cell (assumed)	~~12~~ lbs.
Watt-Hours per Pound	~~14.7~~
" " available	
by long Charging	~~20~~

Data on 3" Tube in Special Electrolytes.

Electrolyte = 21 % KOH containing 2 g. SiOH to cell of 175 cc.
Average of Tubes = 599.2 - 94

Total Capacity 1155 m-a-h

Charge 6 hrs. @ 200 m-a.
Discharge @ 150 m-a

Milliampere-Hour Input	1200
" " Output	900
Av. P.D. of Charge	1.73
" Discharge	1.24
Ampere-Hour Efficiency	75 %
Watt-Hour "	53.7 %

Electrolyte = 13 % KOH containing 2 g SiOH to cell of 175 cc.
Average of Tubes = 600.7 - 09.

Total Capacity 1132 m-a-h

Charge 6 hrs. @ 200 m-a.
Discharge @ 150 "

Milliampere-Hour Input	1200
" " Output	942
Av. P.D. of Charge	1.75
" Discharge	1.22
Ampere-Hour Efficiency	78.5 %
Watt-Hour "	54.7 %

6/4/07.

Reverse Treatment of Old Tubes

These Tubes were previously treated with SiO_2H with no beneficial result. See under date of 5/9/07. First run here given is the last run after the SiO_2H treatment.

649	2% H_2O_2	375	Reversed 48 hrs @ 300 m.a. in Solution not changed	487	500	500		
650	"	415		525	533	528		
651	"	420		580	587	532		
658	"	700		800	786	792		
659	"	730		820	815	812		
660	"	702		755	760	765		
2455	2% H_2O_2 + 2g SiO_2H	427		405	400	408		
2456	"	252		240	235	220		
2457	"	80		52	75	70		

649	670	663
650	700	691
651	767	760
658	815	805
659	875	865
660	742	735

8/12/07.

Reversed 48 hrs @ 300 m.a. in 2% H_2O_2 + 2g SiO_2H. Then changed solution to neg 2% H_2O_2.	620	635	650	658	662	667	
	690	691	690	695	697	706	
	737	730	742	755	758	770	
Reversed 48 hrs @ 300 m.a. in 15g H_2O_2 neutralized with SiO_2H. Then changed solution to neg 2% H_2O_2.	795	807	805	820	822	818	
	885	878	871	885	880	877	
	730	740	737	748	743	750	

4/5/07.

Low Capacity E18 Cells.

Endurance of cells which were brought up by changing the KOH and running on a long charge.

All these are said to have run less than 50 amp-hrs. on commercial chg.

#42233	3 Blind Cells with 30% KOH	123	135	126.5	7.5 Commercial Running Sandbar	105.5	105.5	107
60922		32	67	130.2		97.5	104	103.5
01 7035		40.5	83.5	147		107.7	113	114
1 7181		110	157	151		103.5	106.5	107.5
1 10455		129	123	122.5		Short Circuit		
02 10634		133.5	142.5	137		119	123	124
12537		76.5	133	137.5		121.5	128	129.5
12354		118	153.5	143		126.7	133.5	133.5
12382		82	139	141.5		132	138.5	142
12402		121.5	140	133		115.5	120	120.5

6/11/07

Regular Tubes in Different Electrolytes.
Capacity at Normal Temp + @ 130° F.

	Electrolyte	Capacity in Ohmhours	Cap. in Ohmhours (Full Army)	Cap. in Ohmhours 100 Amp. (Full Army)	Cap. in Ohmhours Approximate (Full Army)
			Out 130° F.		
591 A	15 % NaOH + 2 g. SiO2H.	1190	970	625	1175
" B	21 % KOH + " "	1149	767	502	1160
" C	" " saturated w. SiO2H	1050	1025	760	1113
592 A	21 % KOH.	1133	666	385	1087
" B	" "	1165	672	382	1112
" C	15 % NaOH.	—	832	507	1127

6/11/07.

Regular 3" Tubes in 21 oz. KOH.

Temperature Effect.

		Charged 5 hrs @ 0.400 Discharged @ 150°	Charged 5 hrs @ 0.400 Discharged @ 150°
5414	Charged and Discharged at Normal Temperature	750	587
5972		790	600
5413	Charged at 130° F. Discharged Normal Temp.	350	452
5971		335	402

6/27/07.

*594 Fe in Magnetic Field.
One 5 g. Reg. Fe / Four Tubes.
Chg'd 15 hrs. @ 400 – Discharg'd @ 300.

RUN*	To I.V.	
8	1667	Regular
9	1530	"
10	1620	"
11	1885	In Magnetic Field on Discharge.
12	1675	Regular
13	1885	In Magnetic Field on Discharge
14	1900	" " "
15	1700	Regular
16	1575	"
17	1700	"
18	1720	"
19	1900	In Magnetic Field on Discharge
20	1930	" " "
21	1895	" " "
22	1960.	" " "
23	1975	Same but Polarity of Magnet Reversed

Found that magnet heated up when current was on and cell was heated by magnet. Temp. in cell after 23rd run was 104° F.

7/8/07.

Results of Tests made on Tube Cells for Mr. Kammerhoff.

	Tube Number of Quicksilver Gauge	Charged 15 hrs @ 7.00 Discharged @ 7.00	Discharged	Discharged	Discharged		Charged 6 hrs @ 7.00 Discharged @ 7.00	Discharged	Charged 5 hrs @ 7.40 Discharged @ 7.00	Discharged	Charged 5 hrs @ 7.40 Discharged @ 7.50	Discharged	Charged 4 hrs @ 7.00 Discharged @ 7.00	Discharged
5000	243		966	1000	1000	2% of KOH	703	703	623	786	646	645	633	663	603
01	"		961	993	990		713	703	626	793	660	654	645	666	605
02	"		990	1016	1006		733	710	653	813	676	662	654	680	620
5849	113		1283	1231	1220	2% of KOH + 2% of K_2CrO_4	930	900	820	1016	916	850	879	906	846
50	"		1316	1256	1230		960	913	856	1036	933	858	879	926	866
51	"		1356	1256	1233		960	920	863	1053	950	879	891	943	900
5855	113		800	1160	1143	2% of KOH + 2% of K_2CrO_4	896	860	898	966	840	783	804	833	796
56	"		1178	1161	1133		898	873	778	980	863	796	817	870	800
57	"		1178	1163	1133		920	890	800	986	886	820	829	876	816
6705	None	825	946	983	990	2% of KOH	793	760	713	856	743	717	704	700	660
06	"	796	925	956	963		760	740	686	820	713	683	675	693	630
07	"	803	926	963	965		763	748	693	850	720	695	695	700	656
6708	"	853	984	1030	1026	2% of KOH + 2% of K_2CrO_4	823	800	743	896	780	760	762	773	726
09	"	820	961	1020	1023		825	798	720	883	773	737	754	748	713
10	"	861	983	1031	1031		843	820	743	916	806	782	783	793	743
6711	"	846	1000	1043	1030	2% of KOH + 2% of K_2CrO_4	833	796	746	900	800	762	775	810	763
12	"	873	1016	1063	1046		838	800	746	900	800	770	782	816	763
13	"	860	1001	1046	1030		826	800	730	890	790	754	766	803	743

7/11/07.

Old Tubes Tested for Efficiency

Charged 5 hrs. @ 200 m-a.
Discharged @ 150 m-a.

*761	733	728	
762	713	713	
763	752	750	

These cells have had a total of 835 "cold" runs.
The capacity on overcharge was -

*761	960		823
762	877		925
763	947		887

Charged 5 hrs. @ 200 m-a.
Discharged @ 150 m-a.

*1575	603	575	570
1576	616	580	580
1577	645	590	595

These cells have had 550 hot and 52 "cold" runs.
The capacity on overcharge was -

1575	922		830
1576	802		950
1577	907		780

7/12/07.

Hot Endurance Test of Efficient Fes.

		Opening Volt	Carp on Overdrop	Av. % Efficiency on 75% Rch.	50 Runs on Hot Test. Charged 300	Carp on Overdrop	Sides	Sides	Sides
3873	4.5	1860	90.2		1130	1300	1350	1367
74	"	1870	88.9		1230	1430	1525	1520
3875	"	1725	93.7		972	1090	1100	1125
76	"	1725	91.3		600	812	900	930
3857	"	1775	87.4		1200	1500	1542	1525
58	"	1760	87		1230	1530	1590	1560
3867	"	1650	87		1230	1392	1500	1537
68	"	1630	87.1		1020	1320	1380	1375
3869	"	1505	90.4		1150	1400	1480	1477
70	"	1550	90		1000	1315	1390	1420
3877	5.5	1705	88.1		1400	1815	1880	1870
78	"	1515	83.3		1215	1540	1660	1672
3885	4	1575	88.7		1210	1562	1625	1597
86	"	1627	88.5		1222	1560	1550	1557

Efficiency Runs.
Charged 300 m-a-h per
Opening at 300 m-a Rate

Run 69	70	71	72	73	Av. % Efficiency on 75% Rch.
1155	1100	980	900	875	64.8
1242	1092	1115	1000	980	72.6
1120	1020	930	810	830	61.4
875	917	900	820	850	62.9
1032	900	850	820	865	64.1
1282	1235	1170	1135	1087	80.4
1250	1097	1170	1135	1090	80.7
1012	910	890	660	740	54.8
1285	1222	1180	1130	1092	80.9
1287	1250	1150	1040	1017	75.3
1400	1270	1247	1260	1227	74.3
1307	1262	1160	1185	1140	69.1
1122	1100	1060	1040	1010	84.1
1132	1060	980	945	900	75

7/25/07.

Regular Mix, 5 g. Fes after Charged 15 hours at 400 m-a. @ 300. Chg'd 5 hrs. @ 300. Run @ 300.

7/25. Fes stood in KOH one month after the treatments before they were run.

Special Treatment.

	Run @ 300			Run @ 750			Run													A-H Eff.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
596 A	1430	1480	1200	987	1100	1175	1640	1462	1580	1560	1587	1230	1217	1160	1190					79.3 %
" B	1517	1500	1235	975	1112	1168	1645	1500	1580	1577	1587	1232	1222	1172	1225	20247				81.6
597 A	960	1200	820	725	1012	1056	1500	1450	1500	1507	1530	1212	1180	1115	1150	17 9 17				76.6
" B	1062	1365	775	668	1000	1050	1540	1415	1600	1572	1592	1210	1225	1180	1227					81.8
598 A	1100	1310	1065	956	1150	1250	1630	1490	1600	1600	1625	1255	1227	1180	1250					83.3
" B	1080	1265	1080	975	1150	1193	1610	1575	1550	1560	1585	1200	1180	1120	1195					79.6
599 A	1080	1470	1135	962	1150	1237	1700	1500	1625	1622	1650	1220	1200	1165	1220					81.3
" B	1135	1432	1050	850	1075	1200	1645	1452	1625	1592	1625	1200	1205	1170	1200					80
600 A	1272	1520	1187	975	1187	1300	1715	1680	1640	1627	1625	1230	1215	1177	1230					82
" B	1250	1500	1177	975	1100	1218	1675	1477	1600	1587	1625	1230	1215	1185	1230					82
601 A	785	860	900	825	981	1081	1500	1430	1500	1530	1562	1230	1185	1122	1155					77
" B	990	1272	1000	850	1006	1131	1540	1425	1550	1540	1577	1245	1210	1175	1205					80.3
602 A	1100	1470	1175	1068	1187	1243	1700	1500	1640	1630	1650	1242	1230	1197	1240					82.6
" B	1150	1500	1265	1081	1193	1300	1735	1532	1650	1637	1650	1255	1260	1207	1245					83
603 A	1300	1500	1060	975	1068	1193	1625	1450	1565	1562	1595	1240	1230	1190	1240					82.6
" B	1300	1500	1070	829	1018	1125	1610	1442	1570	1562	1585	1255	1245	1177	1235					82.3
604 A	1277	1240	940	854	1075	1156	1560	1440	1515	1560	1590	1200	1185	1140	1185					79
" B	1320	1267	800	775	987	1162	1622	1460	1600	1580	1615	1235	1210	1125	1170					78
605 A	1327	1300	515	650	968	1150	1535	1415	1560	1582	1615	1250	1240	1195	1235					82.3
" B	1300	1182	680	712	975	1125	1532	1400	1530	1558	1605	1230	1240	1187	1210					80.6

Runs #3 and #8 were made on Monday after standing.

7/29/07.

Res from Tube Cell #2826.

	2826 A		2826 B		
	M.A.H.	A-H Eff.	M.A.H.	A-H Eff.	
Run #6	1850	—	1815	—	Chg'd 15 hrs. @ 400.
" 7	1515	101	1375	91.6	Chg'd 5 hrs. @ 300.
" 8	1335	89	1305	87	" "
" 9	1112	74	1170	78	" "
" 10	1135	75.6	1150	76.6	" "

8/2/07.

R.A. Be Mix* 1029 A. Special Treatment. 5 grams Pellets.
M.A.H. to 1V. after 15 Hours Charge at 1400 m-a.

	Preliminary Treatment.	Run @ 300 1	2	3	Run @ 750 4	5	6	Run @ 300 7	8	9	10	11
596 C	Regular - No Treatment	1620	1880	1665	1775	1762	1768	1657	1610	1675	1680	1640
" B		1582	1870	1647	1781	1768	1750	1630	1585	1630	1665	1635
597 C	Charged 15 hrs. @ 400 m-a.	1477	1787	1590	1712	1187	1187	1577	1535	1615	1625	1600
" B	at 130° F.	1500	1830	1665	1793	1781	1787	1635	1600	1635	1670	1622
598 C	Reversed 15 hrs. @ 400 m-a.	1532	1825	1620	1775	1750	1731	1615	1560	1620	1637	1600
" B	at 130° F.	1487	1800	1632	1300	1781	1787	1635	1597	1637	1645	1620
599 C	Charged and Reversed	1550	1780	1600	1787	1762	1775	1600	1550	1600	1647	1615
" B	Rolls at 130° F.	1608	1835	1625	1781	1737	1750	1630	1562	1627	1652	1625
600 C	Two Charges and Two	1462	1715	1590	1700	1181	1700	1600	1542	1620	1660	1630
" B	Reverses at 130° F.	1470	1697	1560	1750	1706	1750	1607	1540	1600	1650	1590
601 C	Charged and Reversed	1155	1435	1400	1181	1156	1162	1525	1485	1572	1590	1425
" B	at 200° F.	1000	1312	1330	1168	1143	1143	1522	1480	1542	1592	1537
602 C	Charged and Reversed	1648	1790	1617	1750	1737	1750	1610	1580	1590	1645	1600
" B	at 130° F. in 33% KOH.	1632	1797	1612	1768	1731	1750	1595	1540	1615	1637	1587
603 C	Charged and Reversed	1465	1755	1587	1793	1762	1725	1562	1500	1600	1652	1600
" B	at 130° F. in 31% KOH + SiO2.	1500	1772	1580	1718	1193	1193	1597	1537	1600	1660	1615
604 C	Cell Fully Charged and	1775	1937	1745	1387	1362	1331	1762	1660	1710	1700	1690
" B	Short-Circuited, 3 Times.	1755	1912	1690	1362	1212	1187	1670	1620	1670	1670	1640
605 C	Fully Charged and Allowed	1587	1795	1565	1200	1181	1125	1610	1535	1610	1647	1590
" B	to Self-Heat - 3 Times.	1642	1960	1615	1750	1731	1725	1627	1580	1622	1670	1600
" D												

R.A. Fe Mix. #1029A Special Treatment. 5 grain Pockets.
M.A.H. to 1V after 5 Hour charge @ .300 M.A.

Chg. 5 hrs. @ 300. Run @ 300.

	12	13	14	15	16	17	Vis Eff.	A.H. Eff.	W.H. Eff.
596C	1327	1262	1240	1200	1240	1235		82.3	
" D	1320	1250	1230	1200	1222	1220		81.3	
597C	1275	1210	1172	1125	1157	1150		76.6	
" D	1317	1250	1222	1200	1230	1227		81.8	
598C	1300	1237	1200	1177	1217	1212		80.8	
" D	1320	1232	1230	1212	1230	1227		81.8	
599C	1320	1250	1225	1187	1230	1225		81.6	
" D	1322	1250	1205	1175	1222	1215		81	
600C	1332	1235	1215	1172	1225	1220		81.3	
" D	1332	1250	1212	1145	1210	1200		80	
601C	1117	1070	1057	1020	1100	1090		72.6	
" D	1262	1200	1150	1110	1127	1125		75	
602C	1332	1250	1230	1190	1237	1232		82.1	
" D	1335	1275	1240	1200	1230	1230		82	
603C	1325	1237	1220	1180	1207	1200		80	
" D	1300	1237	1180	1150	1167	1165		77.6	
604C	1350	1280	1270	1230	1275	1270		84.6	
" D	1300	1237	1235	1195	1232	1230		82	
605C	1267	1200	1160	1120	1150	1144		76	
" D	1285	1210	1175	1135	1157	1150		76.6	

8/17/07.

Sitkinum Treatment of Sour Coop-
Cells given several runs after
dunance runs, until results became

	3			8			13
14106	77	Added 10 g KOH		92	Run Hot 2 min		102
14615	81.5	" 20 "		124	" " "		131.5
14626	89	" 30 "		134	Put in 24 g KOH		137
14640	77	" 40 "		123	" " "		130
14642	83	" 50 "		131	Run Hot 2 min		139

	103	2.5 Endurance Runs	131	50 Endurance Runs	134	50 Endurance Runs	137
14106	88		88		80.5		91
14615	119.5		120.7		116		106
14626	134		132.5		134.5		125
14640	120		122		115		105.5
14642	138		135		137		129

acity Z18 Cells. (Cont'd from Front of Book-5/9)
each treatment and each set of en-
constant. Last run only in each case is given.

	42	2.5 Endurance Runs	72	2.5 Endurance Runs	100	Put in 21 g KOH.	101	102
	103	Put in 4 g more KOH	92		87.5		90	89
	143	2.5 Endurance Runs	122.5		122		121	123.5
	152		134		132.5		134.5	133
	142		123.5		122		121	123.5
	152.5		134.5		135		140	139

Changed KOH	238	50 Endurance Runs	292		
	72		65		
	105		95		
	124.5		125.2		
	108		105		
	121.2		119.5		

Tes Loaded from End. | Charged 15 hrs. @ 400 m-a. 8/30/07.

	Mix	Plunger	S.P. + Corr.	Weight	Run @ 300			Run @ 750			Run @ 300			
#1	792	15½ oz.	100 - 150	7.588	2115	2037	2270	1368	1525	1687	2270	2110	2085	2080
2	"	"	"	7.633	2140	1977	2225	1400	1500	1650	2275	2105	2080	2075
3	"	"	"	7.627	2075	1977	2180	1375	1625	1700	2277	2110	2115	2090
4	1033	15½ oz	100 - 150	7.062	2367	1865	2000	1568	1637	1700	2322	2180	2077	2115
5	"	"	"	7.124	2345	1867	2050	1450	1500	1568	2250	2100	1977	2005
6	"	"	"	7.057	2325	1720	1840	1450	1481	1562	2307	2145	1900	1940
7	1033	15½ oz.	75 - 100	7.075	2330	2240	2000	1500	1625	1750	2287	2110	2160	
8	"	"	"	7.09	2295	2200	1967	1450	1556	1750	2285	2090	2167	
9	"	"	"	7.152	2325	2135	2040	1481	1625	1762	2270	2080	2165	
10	1033	15½ oz.	150 - 200	7.04	2220	2055	1840	1306	1343	1500	2060	1985	2030	
11	"	"	"	7.099	2275	1710	1375	1025	1068	1262	2040	1990	2022	
12	"	"	"	7.035	2265	2025	1870	1325	1325	1437	2030	1980	1995	
13	1033	24¾ oz	100 - 75	7.40	2405	1890	1600	1281	1293	1412	2107	1975	2010	
14	"	"	"	7.405	2275	1807	1540	1293	1325	1450	2140	2035	2080	
15	"	"	"	7.499	2350	1915	1635	1343	1400	1525	2225	2060	2105	
16	1033	24¾ oz	100 - 150	7.423	2277	1905	1780	1231	1312	1437	2082	1972	2025	
17	"	"	"	7.454	2312	1942	1820	1206	1275	1406	2100	2007	2047	
18	"	"	"	7.44	2350	1915	1787	1300	1343	1500	2100	2000	2015	
19	1033	24¾ oz	150 - 200	7.438	2210	1825	1800	1106	1143	1325	1847	1840	1827	
20	"	"	"	7.428	2187	1730	1657	1068	1075	1150	1800	1800	1787	
21	"	"	"	7.465	2300	1855	1740	1112	1125	1206	1877	1867	1840	
22	792	15½ oz	100 - 75	7.707	2005	1910	1947	1375	1437	1637	2225	2025	2052	
23	"	"	"	7.575	2005	1892	1900	1337	1400	1531	2140	1955	1980	
24	"	"	"	7.721	2005	1910	1985	1343	1406	1537	2230	2055	2080	
25	792	15½ oz	150 - 200	7.66	2150	1885	1800	1012	1025	1162	1837	1815	1992	
26	"	"	"	7.272	2130	1895	1835	1075	1125	1268	2007	1950	1935	
27	"	"	"	7.545	2100	1910	1835	1212	1250	1375	2025	1947	1950	

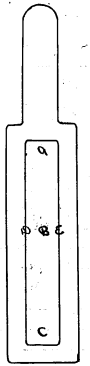
Zeo.	Cap.	A.H. Eff.
*1	1650	78.6
2	1600	76.2
3	1707	81.3
4	1395	66.9
5	1307	62.2
6	1300	61.9
7	1415	67.4
8	1395	66.4
9	1380	65.7
10	1300	61.9
11	1240	59.1
12	1300	61.9
13	1255	59.7
14	1300	61.9
15	1300	61.9
16	1275	60.7
17	1300	61.9
18	1280	60.9
19	1200	57.1
20	1185	56.4
21	1200	57.1
22	1707	81.3
23	1660	79
24	1640	78.1
25	1415	67.4
26	1607	76.4
27	1650	78.6

9/18/07.

Zeo loaded from end in new machine. All charged 7 hrs. @ 300 m-a and discharged @ 300. See previous page for data as to weights etc.

Zeo	A	B	C.	D	E
1	11	11	9	8	10
2	7	9	7	7	10
3	9	11	8	12	9
4	12	15	11	8	9
5	9	9	7	7	11
6	15	12	10	3	11
7	12	12	9	8	10
8	11	14	13	8	11
9	8	10	5	7	8
10	11	7	15	4	3
11	9	12	9	12	9
12	9	8	10	2	5
13	12	8	10	10	5
14	12	15	11	8	7
15	14	16	10	8	9
16	10	5	6	9	7
17	8	7	9	12	5
18	9	7	11	5	8
19	12	10	11	0	4
20	15	16	12	13	13
21	6	12	10	1	1
22	5	10	10	5	7
23	10	9	8	10	6
24	8	8	7	6	4
25	9	9	7	4	6
26	7	3	7	6	6
27	7	9	5	2	5

Swell of pocket in mils, after 8 runs.



9/24/07

Hot Test 700

	Opens %	% of Hot Runs	Cage on Crossing	Crossing Capacity % of Original	Correction of Crossing Efficiency	% of Original	O-N Efficiency	% of Original
3873	4.5	100	1435	79.3	990	73.6	82.5	
74	"	"	1507	80.5	1132	83.9	94.4	
75	"	"	1210	70.1	960	71.1	75.8	
76	"	"	1037	60	1085	80.4	88.1	
3857	"	"	1385	78	1110	82.2	94.1	
58	"	"	1465	83.2	1162	86.2	99.1	1
3867	"	"	1545	93.6	1225	90.7	96.9	3
68	"	"	1100	71.9	865	64.1	73.6	
69	"	"	1072	68	1195	88.5	97.9	2
70	"	"	1100	71	1150	85.1	94.5	
3877	5.5	"	1870	109.7	1250	75.7	86	
78	"	"	1675	110.5	1280	77.6	93.2	
3885	4	"	1565	99.4	1090	90	101.3	
86	"	"	1500	92.3	897	74.8	84.5	
3946	"	50	1600	97.8	1060	88.3	98.5	
47	"	"	1605	100.7	1060	88.3	104.9	
3980	"	"	1735	94	1067	88.9	103.6	
81	"	"	1510	82.9	1070	89.1	1.07	
82	"	"	1517	89.1	990	82.5	99.9	
83	"	"	1510	88.5	1130	94.1	106	
4082	5	"	1740	92.5	1255	90.3	103.6	
83	"	"	1790	96.2	1325	88.3	101.2	
84	"	"	1700	95	1270	84.6	94.4	1
85	"	"	1735	102	1350	90	99.7	

10/4/07.

Hot Test Jar

Capacity

	Run #115 Ira Hopper	Reassembled with 47 Tubes Kept Same Solution.	Run #116	" #117	" #118	Chg'd 15 hrs. @ 400 Discharg'd @ 300
4334	1250		1275	1830	1900	
35	1285		1300	1832	1925	
36 x	1665		1265	1615	1707	Si
4337	1240		985	1612	1720	
38	1245		992	1615	1620	
39 x	1495		950	1345	1530	Si
4340	1375		1125	1720	1872	
41	1400		1175	1837	1935	
42 x	1740		1350	1722	1815	Si

Cells marked "x" contain 21 o/o KOH + 3 g. Si OH. Others are regular in 21 o/o KOH.

Before reassembling, each Jar was running with only two tubes.

Cells stood 14 days after Run #115 before they were reassembled.

Efficiency

	Run #119	" #120	" #121	" #122	Chg'd 5 hrs. @ 300 Discharg'd @ 300	Volt Efficiency	Amp-Hr. "	Watt-Hr. "
4334	1352	1310	1285	1292		72.8	86.1	62.6
35	1395	1335	1325	1325		73	88.3	64.4
36	1285	1252	1270	1230		71.8	82	58.9
4337	1280	1180	1145	1125		73.1	75	54.8
38	1215	1150	1135	1077		73.1	71.8	52.5
39	1205	1140	1160	1130		71.7	75.3	53.9
4340	1360	1310	1287	1235		72.6	82.3	59.8
41	1410	1335	1325	1305		72.8	87	63.4
42	1375	1325	1340	1260		71.6	84	60.1

Tess Soaked in New Machine. Charged 15 lbs. @ 400 m-a. 10/4/07.

	Mix	Plunger	Atm. Pressure	Weight	Run @ 300			Run @ 750			Run @ 300		
28	7.92	8½ oz	S.P. 100	7.349	1785	1665	1652	1312	1468	1462	2057	1935	1805	1907
29	"	"	" "	7.293	1725	1650	1625	1462	1625	1656	2150	2020	1915	1967
30	"	"	" "	7.155	1725	1617	1600	1425	1600	1625	2140	2020	1900	1950
31	"	"	Not Pressed	7.120	1605	1422	1670	1375	1575	1531	2055	1945	1835	1900
32	"	"	" "	7.340	1595	1470	1585	1412	1612	1618	2100	1980	1847	1920
33	"	"	" "	7.307	1597	1450	1650	1375	1537	1500	2047	1937	1800	1920
34	"	"	Corr. 150	7.162	1910	1755	1715	1237	1375	1456	2035	1955	1827	1925
35	"	"	" "	7.205	1900	1740	1675	1167	1275	1343	1950	1922	1775	1900
36	"	"	" "	7.205	1915	1745	1677	1150	1250	1325	1930	1920	1770	1885
37	"	10½ oz	Not Pressed	7.590	1672	1615	1592	1456	1625	1612	2097	1982	1885	1950
38	"	"	" "	7.365	1600	1440	1655	1400	1600	1606	2060	1925	1822	1907
39	"	"	" "	7.415	1685	1530	1570	1400	1550	1487	2100	1960	1887	1935
40	"	"	S.P. 100	7.425	S.C.	1745	1425	1200	1306	1318	2015	1927	1765	1867
41	"	"	" "	7.490	1715	1660	1615	1487	1625	1612	2135	2020	1930	1975
42	"	"	" "	7.570	1750	1625	1595	1431	1600	1600	2167	2020	1900	1970
43	"	"	Corr. 150	7.530	1725	1750	1730	1231	1350	1425	2015	1965	1840	1940
44	"	"	" "	7.293	1932	1780	1750	1225	1356	1443	2060	1990	1880	1975
45	"	"	" "	7.590	1905	1740	1730	1168	1300	1350	2050	1972	1875	1960
46	"	12½ oz	Not Pressed	7.705	1682	1595	1625	1468	1612	1612	2135	1975	1877	1940
47	"	"	" "	7.560	1680	1557	1625	1481	1612	1587	2130	1977	1880	1945
48	"	"	" "	7.660	1727	1585	S.C.	1606	1606	1581	2167	2000	1890	1960
49	"	"	S.P. 100	7.605	1780	1600	1600	1168	1306	1272	2100	1930	1775	2060
50	"	"	" "	7.538	1775	1675	1685	1525	1662	1650	2190	2035	1955	2015
51	"	"	" "	7.575	1785	1680	1735	1375	1618	1593	2225	2065	1935	2035
52	"	"	Corr. 150	7.610	2005	1915	1735	1187	1337	1450	2100	2025	1895	2065
53	"	"	" "	7.600	1975	1830	1760	1287	1462	1593	2150	2055	1930	2072
54	"	"	" "	7.638	2025	1840	1735	1200	1318	1418	2060	1972	1882	1932

10/5/07.

5 Grams Fes – #1034 Mix.

Each with 4 Tubes in 100 cc of Solution.

Efficiency on 4th Run.
Chg'd 5 hrs @ 300. Run @ 300

Fe#	Electrolyte	Charged 15 hrs. @ 400 milamps. Run @ 300.			Run @ 750				Run @ 300			Hydr	Efficiencies		
		1	2	3	4	5	6		7	8	9	13	Volt	Q-H	W-H
626	21% KOH	1470	1495	1675	1068	1100	1062		1695	1612	1655	1170	72.4	78	56.5
27		1460	1530	1735	1087	1162	1125		1732	1630	1655	1167	71.3	77.8	55.4
28		1472	1490	1670	906	962	962		1690	1560	1640	1165	72.5	77.6	56.2
629	21% KOH +	1497	1492	1685	1093	1112	1087	23.3	1695	1572	1655	1195	73.2	79.6	58.3
30	2g SiOH	1475	1585	1760	1137	1200	1156		1740	1650	1722	1220	72.7	81.3	59.1
31		1470	1585	1750	1100	1162	1112		1740	1650	1722	1222	72.8	81.5	59.3
632	21% KOH +	1665	1660	1815	1156	1218	1212	26.18	1735	1620	1717	1225	72.7	81.6	59.4
33	4g SiOH	1690	1700	1832	1137	1193	1156		1737	1642	1722	1270	72.9	84.6	61.7
34		1630	1625	1805	1137	1193	1162		1740	1620	1722	1250	72.9	83.3	60.7

10/16/07.

Special Treatment.

Sow Corp. E18 Cell #7779.

Filled with fresh 21 o/o KOH and run - charging 15 hrs. @ 40 and discharging @ 30.

Run #1 69 A-H to 1V.
2 61 "
3 59.7 "

Poured out electrolyte and filled cell with 5 o/o KOH (890 cc), to which had been added 30 g. of SiO_2H_2 (opaline)

Ran again. - charging 30 hrs. @ 20 amps. and discharging at 15 amps.

Run #4 108.5 A-H to 1V.
5 108.1 "

Soaked in H_2O followed by 5 o/o KOH. Then put in fresh 5 o/o KOH + 30 g. SiO_2H_2 and run at normal rate as on first run.

Run #6 104 A-H to 1V.
" 7 — Test Spoiled.

Chg'd 30 hrs @ 20, discharg'd @ 15 amps.

Run #8 123.3
" 9 126

E18 #7779 Cont'd.

Chg'd 30 hrs. @ 20 amps. - discharg'd @ 15.

Run #10 125 A-H.

Filled cell with regular 21 o/o KOH.

Run #11 122.5
" 12 121.6
" 13 122

Chg'd 15 hrs. @ 40 - discharg'd @ 30 amps

Run #14 103.5

10/21/07.

Sow Capacity E18 Cells — Second Treatment.

See Previous History in front of this book under 5/23/07.
Charged 15 hours at 40 amps. — discharged at 30 amps.

	147		148	149	150		176	177
7837	76.5	7 Stick Each Cell under 10 % KOH + 30 % Li OH.	87.5	92	93	25 Performance Runs	83.5	86.5
7839	78		91.5	96	98		88	90.5
11475	104.2		110	113.5	115		102	102.7
11497	112.5		111	113.5	114.7		98	100
11514	93.5		96.5	96	93		87.5	90
11633	69		75.5	80.5	76		81.5	85
11643	90		94.5	97	95		101.7	100.5
11699	76.7		87	88.5	87		89.5	90
11751	92.5		99	102	100		102	100.5

							@ 15	
7837	Charge Regular — Then let stand 3 days before discharge.	16	Charge + Discharge Regular.	75	Put in Fresh 7.5 % KOH.	78.7	93.2	C.O.
7839		50		69		74.5	94.7	C.O.
11475		71.2		86.5		95	108.7	C.O.
11497		71.5		86.5		89	107	C.O.
11514		95		107		111	117.5	Hup
11633		65		78.7		82.5	94	C.O.
11643		78.5		98.5		99.5	107.5	Hup
11699		69.2		85		89.5	101.5	C.O.
11751		77		98		95	109.5	Hup

	178	179	180		181	182
Charge Hot @ 130° F.	77.5	75	71.5	Run Regular at 7 hours of Charge for 72 hours.	82	79.7
Discharge Normal	77.5	66	64		69	69.7
	93	85	80.5		91	90.7
Charge Normal	103	103.5	103.5		90	90.5
Discha @ 130° F.	97.5	97	98		Reversed	120
	83	83.5	84.2		80.5	81.5
Charge + Discharge	93.5	92	92.5		100	100
Normal. (2 hrs stand	83.5	83.5	83.5		91	90.5
between C + D.)	95	92	92.5		99	100

10/22/07

Special Fes – Regular Runs

5 Gram Cakes – Oxydized Cups.

Efficiency on 4th Run.
Chg'd 5 hrs. @ 300. Run @ 300.

Test #	Exp.	Mix	Charged 15 hours @ 400 milamps. Run @ 300			Run @ 750				Run @ 300			Math.	Efficiencies		
			1	2	3	4	5	6		7	8	9	13	Volt	A-H	W-H
4494	"5 S.O.	792	1225	1165	1200	887	856	900		1410	1552	1535	1122	72.1	74.8	53.9
4495	"	1034	1465	1350	1275	625	531	525		1260	1335	1412	985	69.2	65.6	45.4
4496	"9 S.O.	792	1215	1120	1155	781	775	750		1340	1450	1510	1092	70.9	72.8	51.6
4497	"	1034	1475	1505	1635	1031	931	975		1640	1657	1655	1070	72.6	71.3	51.7
4498	"10 S.O.	792	1215	1212	1240	800	806	812		1415	1515	1520	1150	72.1	76.6	55.3
4499	"	1034	1460	1475	1590	937	912	937		1590	1600	1562	1050	71.8	70	50.3

10/22/07.

Tes Soaked in New Machine.

Special Mix #1045 P.A.
All Soaked with 33½ oz. Plunger.

Changed 15 hours @ 400 m-a.

Tes #	Press	Weight	Plum @ 300 1	2	3	Plum @ 750 4	5	6	Plum @ 300 7	8	9	10	11	12	13
55	Not Pressed	7.37	1550	1425	1540	1468	1418	1343	1695	1500	1425	1520	1517	2640	2277
56		7.39	1640	1485	1535	1462	1468	1400	1730	1490	1425	1460	1495	2770	2310
57		7.40	1690	1525	1585	1500	1418	1250	1830	1540	1470	1465	1510	2645	2275
58	S.P. 100	7.37	1640	1395	1440	1343	1212	1150	1585	1382	1315	1350	1365	2280	1800
59		7.21	1637	1375	1420	1331	1237	1100	1600	1297	1300	1295	1325	2340	1875
60		7.17	1690	1480	1540	1500	1468	1312	1850	1537	1450	1480	1475	2785	2265
61	Conv. 150	7.13	1875	1630	1585	1125	1175	1000	1620	1340	1420	1357	1535	2130	1905
62		7.33	2090	1910	1900	1306	1356	1025	1920	1610	1635	1820	1840	2630	2210
63		7.22	1915	1740	1740	1318	1350	1125	1780	1435	1495	1425	1670	2470	2115
	14	15													
55	1970	1780	1685												
56	2020	1840	1760												
57	2000	1875	1790												
58	1450	1460	1460												
59	1547	1550	1470												
60	1975	1800	1700												
61	1700	1425	1425												
62	1780	1785	1737												
63	1807	1750	1660												

Resumed 24 hrs @ 400 m-a. Changed Pots.

Feeding Cloyd and Short Circuited Three Times.

10/25/07.

Sour Capacity & 18 Cells.

Runs Marked (*) Changed 15 hrs. @ 40, Finishing'd @ 30. Others Changed 30 hrs @ 20, runs @ 15.

	1*	2*	3	4		5	6	7		8	9		15 hrs @ 40, 10 @ 60
5088	39	40	This Run was Spoiled.	49	2½ % NaOH + 15 g. SiO2	80.7	84.5	85	Put in Bench Solutions - Some no NaOH and SiO2 no Sulphate.	89.5	90		89.2 91
5555	57.7	62.5		80.7	" " 30 g. "	96.5	97.5	96.2		95	91.2		89.2 87
8805	40.5	43.5		48.7	", ", 45 g. "	101	102.3	101.7		107.2	105		101.5 102
8858	39	42.5		44.2	5 % " 15 g. "	80	78.7	77.5		88.7	91.5		88.7 85.5
10747	47	48.5		54	" " 30 g. "	87.5	87.7	87.2		90	89.7		86.7 65
12372	53	54.5		57	" " 45 g. "	119	118.7	118.7		120.5	120.2		116 115
12854	51	51		55	7½ % " 15 g. "	97.5	97.7	97.2	Run 15 hr	107.3			105.2 101.7
14306	59	60.7		60.5	" " 30 g. "	98.2	99	99.5		104.7	106.2		104.2 95.7
14311	53	53.5		51.5	" " 45 g. "	94.2	93	97.2		98.5	101.5		103.2 93.7
14375	58.5	61.5		60.5	10 % " 15 g. "	89	85	86.5		90.7	95		94.7 90.7
14563	52	53.5		53.7	" " 30 g. "	98.2	95.5	98.5		102.7	106.5		106.2 87.2
15425	43	42		43.7	" " 45 g. "	91	91.7	97.2		98.7	104.5		102.5 100

Run 15 hrs with Cells Cooling - Some Cells were dirty, Cells contained Sulphate and causing Leakage Cells.

	@15	@45	@15	@15	@15	@30		@30	@30						
5088	92.2	83.7	50	89.2	94	85		87	87	Same to Hooper					
5555	90.2	74.2	60	83.2	87.5	81		81.5	80.5						
8805	102.5	70.5	58.7	89.5	94	75.5		77.5	76.5	to Hooper					
8858	95	65.6	50	91.7	96	75		79.5	75						
10747	90.5	66	47.5	74.5	78.7	73		71	75						
12372	120	87.7	73.1	111.5	119.2	97		94	93.5						
12854	113.7	88.2	72.5	109	117	104.5		101.5	99						
14306	114.5	84	56.2	104.5	111.5	104.5		106	103.2						
14311	114.5	89.2	53.7	99.5	107.7	103		103	103.5						
14375	101.5	90	67.5	96.5	102	100		97.5	99						
14563	104.2	93.7	50	107	114	107.5		108.5	108.5						
15425	109.2	74.6	55	96.2	103	95		87.2	84.2						

Change Cells Cell + 15 hrs @ 40 amps. Maintenance Cell Cleaned on Tested.

Tested 18 Cells with Reversion 2½ % NaOH

10/28/07.

Temperature Experiments.

3 Inch Tubes, Each Against Four Fes in 21 % KOH.

Tubes* 5413 - 15.

RUN	Charged Hot Discharged Hot	Charged Normal Discharged Hot	Charged + Discharged Normal	Temperature 5413 on Charge 5415 on Discharge	°F.
Charged 15 hrs. @ 300, discharged @ 150					
111	560	952	935	145	
117	603	922	922	130	
122	625	900	917	115	
129	787	890	915	100	
Charged 5 hrs @ 200, discharged @ 150					
112	375	593	705	145	
121	360	657	715	130	
124	450	672	737	115	
131	400	675	725	100	

Tubes* 5971 - 73.

RUN	Charged Hot Discharged Hot	Charged Normal Discharged Hot	Charged + Discharged Normal	Temperature 5971 on Charge 5973 on Discharge	°F.
Charged 15 hrs. @ 300, discharged @ 150.					
32	487	1062	1065	145	
38	572	1030	1062	130	
43	585	1030	1062	115	
50	725	1017	1065	100	
Charged 5 hrs. @ 200, discharged @ 150.					
33	322	550	742	145	
42	325	657	737	130	
45	402	692	742	115	
52	500	677	730	100	

10/28/07.

Standing Tests – Normal and Hot.

3" Tubes, Each against 4 Tes in 21 % KOH.

All changed .15 hrs. @ 300 m-g. at normal. room temperature.

Tubes" 5414-15.

RUN	Time of Standing Before Dissolving	Stand + Dissolving at Normal Temp.	Stand + Dissolving Both at 130° F.
136	5 min.	912	835
143	1 hr.	900	847
145	2 "	885	822
147	3 "	835	832
149	12 "	845	832
150	24 "	845	767
151	3 da.	850	750
152	7 "	775	700

Tubes" 5972-73.

RUN	Time of Standing Before Dissolving	Stand + Dissolving at Normal Temp.	Stand + Dissolving Both at 130° F.
57	5 min	1060	1030
62	1 hr.	1025	983
64	2 "	1017	953
66	3 "	1010	935
68	12 "	982	945
69	24 "	982	908
70	3 da.	965	832
71	7 "	917	820

11/12/07.

Jes Soaked in New Machine.

Deep Pockets Soaked with a Mix # 1051.

14½ oz. Plunger.

Charged 15 hrs @ 400 m-9 — Discharged as Noted Below.

Je #	Press.	Weight	× Run @ 300			× Run @ 750			× Run @ 300			Charged 15 hrs @ 300	Discharged to One Volt		Amp-Hour Efficiency
64	not Pressed	7.53	1100	1080	1050	1675	1718	1981	2410	2412	2410				
65		7.73	1515	1780	2315	1825	1825	2037	2470	2475	2482				
66		7.62	1515	1700	2290	1700	1637	1850	2400	2370	2390				
67		7.51	2170	2350	2440	1700	1643	1850	2410	2405	2362				
68	S.P. 100	7.39	1995	2240	2380	1725	1650	1850	2415	2410	2345				
69		7.69	2227	2460	2405	1700	1637	1850	2460	2440	2365				
70	Con. 150	7.49	2465	2280	2340	1200	1125	1362	2415	2292	2175				
71		7.55	2480	2287	2365	1187	1181	1287	2385	2257	2187				
72		7.51	2475	2660	2520	1687	1687	1750	2660	2510	2330				
												*64	1650	1640	1660	73.8
												65	1660	1595	1630	72.4
												66	1680	1640	1660	73.8
												67	1695	1720	1730	76.9
												68	1620	1650	1675	74.5
												69	1630	1620	1640	72.9
												70	1740	1690	1680	74.7
												71	1730	1680	1680	74.7
												72	1760	1720	1710	76

Low Capacity 2-18 Cells.

Charged 15 hrs. @ 40 amps. and

*5640	51.7	52	2½ % KOH + 60 g SiO2H	61.2	65	
5694	51.5	54.7	" " + 75 g "	68.5	75.7	
6468	56.7	62	" " + 90 g "	74	75	
7252	45.7	48	5 % KOH + 60 g SiO2H	82.5	88.7	
7560	51.5	54	" " + 75 g "	102.5	103.5	
8204	44	48	" " + 90 g "	81	77.5	

SiO2H Treatment. 11/13/07.

Discharg'd @ 30, unless otherwise noted.

D@15			D@15			
95	63.5	70	92.5	given 2 mins	72.5	72
86.7	73.7	80.5	90.7	Charging 10 hrs	84	80
85.5	70.2	75	85	@ 40 amps. and	74.5	74
99.7	89	92.5	102.5	Discharging @	83	79.5
110.7	102.5	105	111.1	30 amps.	97	97.5
93	73	74	92		75	74.5

Low Capacity E18 Cells.

Charged 15 hrs. @ 40 amps. and

*17754	33.7	35.7	21 g. KOH + 15 g. K_2CO_3	32.5	36
14391	53	55	" + 30 g. "	54	55.
15439	45	46.5	" + 45 g. "	43.	43.5

17754	83.5	80
14391	88.5	88
15439	84	80

K_2CO_3 Treatment. 11/13/07.

Discharged @ 30, unless otherwise noted.

D@15				D@15	
35.5	+ 30 g. SiO_2H	71.7	75	82.5	Open 2 mins —
57	" "	85	87	92.2	Charging 10 hrs. @ 60+
48	" "	71.5	75.5	87	Discharging @ 30.

Low Capacity Z18 Cells.

Charged 15 hrs. @ 40 amps. and

					D@15
*8513	23.2	26.5	Reversed 15 hrs @	S.C.	
8821	37.2	40.5	40 amps. Then put	37.5	43.2
10702	40	43	in fresh 21% H2O2.	40	46.2

8513		
8821	75.5	75
10702	86	85

Reverse + 21% H2O2 Treatment. 11/13/07.

Discharged @ 30, unless otherwise noted.

		D@15	
added 30% H2O2 to			Given two mins —
each and Reversed	75	77.2	Charging 10 hrs. @ 60 +
15 hrs. @ 40 amps.	82.5	84.5	Discharging @ 30.

		Overcharge Capacity.							Ampere-Hour Efficiency.							
		Original	After 50 Wett	" 100 Wett	" 150 Wett	" 200 Wett			After 50 Wett	" 100 Wett	" 150 Wett	" 200 Wett				Original
3823	4.5	1357	1435	1422	1477			1860	64.8	73.6	72.4	84.4				89.2
24	"	1520	1507	1482	1530			1870	72.6	83.9	88.4	82.4				88.9
3825	"	1125	1210	1200	1255			1725	61.4	71.1	68.5	80.4	Cupric Ferrous Sodium Sulphate 5% H_2O. S.H.			93.7
26	"	930	1037	800	1050			1725	62.9	80.4	62.2	73.7				91.3
3857	"	1525	1385	1405	1315			1775	64.1	82.2	85.2	80.4				87.4
58	"	1560	1465	1442	1380			1760	80.4	86.2	87	82.2				87
3867	"	1537	1545	1480	1740			1650	80.7	90.7	88.9	88.1	Cupric Ferrous Ammonium Sulphate 5% H_2O.			87
68	"	1375	1100	1050	1760			1580	54.8	64.1	81.4	79.7				87.1
3869	"	1477	1022	910	1125			1505	80.9	88.5	76.6	75.1				90.4
70	"	1420	1100	915	1115			1550	75.3	85.1	75.6	78.1				90
3877	5.5	1870	1870	1665	1770			1705	74.3	75.7	71.8	78.1				88.1
78	"	1672	1675	1670	1665			1515	69.1	77.6	78.8	79.3				83.3
3885	4	1597	1565	1485	1500			1575	84.1	90	80.9	92.9	Ferrous Ammonium Sulphate (Double Salt) 5% H_2O. S.H.			88.7
86	"	1557	1500	1335	1375	*Bad Jar		1627	75	74.8	69.6	74.2				88.5
3946	"	1600	1600	1615				1635	88.3	89.6	82.5					89.6
47	"	1605	1655	1657				1592	88.8	89.7	89.6					84.1
3980	"	1735	1600	1600				1847	88.9	89.2	65	Zn 99, Bi 1, 5% H_2O. Non-Pyrophoric				85.8
81	"	1510	1575	1400				1825	89.1	87.5	90.3					83.3
3982	"	1517	1477	1217				1700	82.5	81.1	75.6					82.6
83	"	1510	1465	1320				1707	94.1	91.7	91.2					88.8
4082	5	1740	1780	1755				1880	90.3	92.6	94.8	Zn 80, W 20, 5% H_2O Non-Pyrophoric. 9.47				87.1
83	"	1790	1735	1700				1860	88.3	82	84.5					87.1
4084	"	1700	1760	1600				1790	84.6	87.3	89.6					89.6
85	"	1735	1775	1675				1700	90	91.6	91.6					90.3

11/22/07.

Pockets from Sour Capacity, Z18 Cell #4593, (425 A-H)

Taken out of the plates and slipped into small spiels. Each 7½ against 2 Zes in neg. 21 o/o KOH. Charged 15 hrs. @ 200, Run @ 100. SiOH Solution used for Treatments is 10 o/o KOH + 30 g. SiOH per Liter.

	1st	5th	
*638	158	190	Chg. in SiOH, Disclg. in KOH
639	207	232	" " " "
640	142	177	Chg. in KOH, Disclg. in SiOH
641	146	175	" " " "
642	143	202	Chg. + Disclg. in SiOH.
643	132	143	" " " "
644	155	193	C 6 hrs. @ 500 in SiOH, D in SiOH.
645	182	217	" " " " "
646	139	165	C 15 hrs. @ 500 in SiOH, D in SiOH.
647	171	203	" " " " "
648	192	212	Chg. 48 hrs. @ 200 in SiOH. Run neg. in KOH
649	185	231	" " " " " "
650	155	180	Rec. 48 hrs. @ 200 in SiOH. Run neg. in KOH
651	151	192	" " " " "
652	161	188	Rec. 48 hrs. @ 200 in KOH. Run neg. in KOH
653	180	217	" " " " " "
654	175	208	O.C. 500 m.a., 24 hrs. in SiOH.
655	127	162	" " " " " KOH.

6th	7th	Gain
200	205	5
216	222	-15
187	215	32
178	207	32
192	193	-9
161	172	29
185	183	-10
202	197	-20
169	173	9
203	208	5
256	273	61
273	295	64
187	258	78
155	205	13
133	172	-16
157	180	-37
250	253	45
156	160	-2

12/9/07

Low Capacity Ni Pockets from Old Z18 Cell #4593.
Treated with Alternating Current as below —

CELL	M.A.H.	TREATMENT	M.A.H.
657	233	3m SiO'H, 1500 m-a, 48 hrs. Run in Same Sol.	190
658	223	" " " " " 21 % KO'H	285
646	173	" " 800 m-a, " " Same Sol.	155 } See Subsequent Treatment Below
647	208	" " " " " " "	188
654	208	" " " 24 hrs. " 21 % KO'H	253
655	162	" KO'H " " " " "	160
646	155	3m SiO'H, 800 m-a. 24 hrs. Run in 21 % KO'H	250
647	188	" " " " "	276
656	195	" " " " "	237

1/14/08.

#18 Cells. Endurance after SiOH Treatment.

Charged 15 hrs. @ 40 amps. — Discharged @ 30.

	2		19	Added				73		73			
# 12372	54.5	Given SiOH	93.5	15 g SiOH				106		—			
12354	51	Treatment —	99	" "				84.2	x	84.5			
14306	60.7	Then Filled	103.2	" "				84.5	x	81.2			
14311	53.5	with Regular	103.5	Regular				89.7		—			
14375	61.5	21 % KOH.	99	"				90		—			
14563	53.5		102.5	"				106.7		—			

50 Endurance Runs

Added 5 g Sn Hydroxy.
To cells marked x.

1/24/08

TUBES.

Special Electrolytes.

Results on Charging 6 hrs. @ 200 m.a. and Discharging @ .200 m-a.

CELL #	ELECTROLYTE
8701	21 g. KOH.
02	"
8703	24 g. KOH.
04	"
8705	27 g. KOH.
06	"
8707	21 g. KOH + 2 g. LiOH.
08	" "
8709	24 g. KOH + 2 g. LiOH.
10	" "
8711	27 g. KOH + 2 g. LiOH.
12	" "

	m.a.h. Capacity	Ave. P.D. of Charge	Ave. P.D. of Discharge	Efficiencies: Volt	Efficiencies: Amp.-hr.	Efficiencies: Watt-hr.
807	1.713	1.228		71.6	67.3	48.1
827	1.711	1.232		72.1	68.9	49.6
817	1.698	1.233		72.7	68.1	49.5
841	1.696	1.236		72.9	70	51
793	1.692	1.236		73	66.1	48.2
795	1.687	1.232		73.1	66.3	48.4
808	1.716	1.215		70.8	74.8	52.9
900	1.717	1.213		70.7	75	53.1
891	1.705	1.216		71.3	74.3	52.9
887	1.705	1.211		71.1	73.9	52.5
873	1.698	1.211		71.4	72.7	51.9
831	1.702	1.203		70.7	73.5	52

1/28/09

TUBES.

Special Electrolytes.

Results on Charging 7 hrs. @ 200 ma. and Discharging @ 200 ma-a.

Cell #	Electrolyte	Amp-Hr Capacity	Av. E.D. of Charge	Av. E.D. of Discharge	Volt Efficiencies	Amp-Hr Efficiencies	Watt-Hr Efficiencies
8701	21 % KOH.	867	1.731	1.225	70.8	61.9	43.8
02	"	887	1.728	1.226	70.9	63.4	44.9
8703	24 % KOH.	880	1.712	1.237	72.2	62.9	45.4
04	"	907	1.709	1.238	72.4	64.8	46.9
8705	27 % KOH.	845	1.701	1.242	73	60.4	44.1
06	"	843	1.699	1.242	73.2	60.2	44.1
8707	21 % KOH + 2 g. SiOH.	963	1.729	1.216	70.3	68.8	48.3
08	" "	970	1.733	1.215	70.1	69.3	48.5
8709	24 % KOH + 2 g. SiOH.	960	1.72	1.216	70.6	68.6	48.4
10	" "	953	1.719	1.216	70.7	68.1	48.2
8711	27 % KOH + 2 g. SiOH.	943	1.711	1.211	70.8	67.4	47.7
12	" "	951	1.712	1.208	70.5	68	47.9

1/30/08.

DATA ON "A-4" — 14 POUND CELL.

Calculated from Results on Tubes #8703-04 when New.
Electrolyte - 24 o/o KOH.
Rate of Charge and Discharge - 200 M.A. on Tube = 32 Amps. on A-4.

On Overcharge.

Ampere-Hour Capacity	189
Average P.D. of Discharge	1.235
Watt-Hour Capacity	233
Watt-Hours per Pound	16.7

On 6 Hour Charge @ 32 Amps.

Ampere-Hour Capacity	132
Watt-Hour Capacity	163
Watt-Hours per Pound	11.6
Average P.D. of Charge	1.697
" " " Discharge	1.234
Efficiency in Per Cent	
Volt	72.8
Ampere-Hour	69
Watt-Hour	50.2

On 7 Hour Charge @ 32 Amps.

Ampere-Hour Capacity	143
Watt-Hour Capacity	177
Watt-Hours per Pound	12.6
Average P.D. of Charge	1.71
" " " Discharge	1.237
Efficiency in Per Cent	
Volt	72.3
Ampere-Hour	63.8
Watt-Hour	46.1

1/30/09.

DATA ON "A-4" — 14 POUND CELL.

Calculated from Results on Tube #8709-10 when New.
Electrolyte — 24 % KOH plus 2 grams SiO_2.
Rate of Charge and Discharge — 200 M.A. on Tube = 32 Amps. on A-4.

On Overcharge.

Ampere-Hour Capacity	19.1
Average P.D. of Discharge	1.195
Watt-Hour Capacity	22.8
Watt-Hours per Pound	16.3

On 6 Hour Charge @ 32 Amps.

Ampere-Hour Capacity	14.2
Watt-Hour Capacity	17.2
Watt-Hours per Pound	12.3
Average P.D. of Charge	1.705
" " " Discharge	1.213
Efficiency in Per Cent	
Volt	71.2
Ampere-Hour	74.1
Watt-Hour	52.7

On 7 Hour Charge @ 32 Amps.

Ampere-Hour Capacity	15.3
Watt-Hour Capacity	18.6
Watt-Hours per Pound	13.3
Average P.D. of Charge	1.72
" " " Discharge	1.216
Efficiency in Per Cent	
Volt	70.6
Ampere-Hour	68.3
Watt-Hour	48.3

2/4/08.

TUBES.

Loss of Charge on Standing in Air.

Regular Tubes each against two Fes in 21 % KOH.

Charged 15 hrs. @ 300 m-a., Discharged @ 200 m-a.

	1	2	3	4	5 C	Treatment.	5 D	6	7
8901	975	1171	1133	1140	Charged Regular	Soaked in H_2O 24 hrs. to dim. inate KOH. Then let tube dry in air 4 days.	871	1120	1113
8902	997	1185	1183	1160		Set stand in the KOH 24 hrs then took tube out and let dry in air 4 days.	900	1100	1088
8903	968	1168	1170	1147		Set stand in the KOH - 5 days.	1020	1123	1110

After 7th run, filled cells with 21 % KOH containing 2 g. LiOH to 175 cc. (See runs on following page.)

TUBES #8901-03, Continued.

Electrolyte changed to 21 o/o KOH + 2 g. SiOH (per 175 cc.)

	8	9	10	11	12C		12D	13	14		15	16	17
										Changed soln.; then –			
8901	1190	1157	1180	1177	Charge Rate	Soaked 24 hrs in H_2O Dried in air 4 days	938	1145	1153	Soaked 1 day in H_2O Dried in air 12 days	970	1150	1153
8902	1173	1150	1178	1183		Soaked 24 hrs in KOH Dried in air 4 days	756	1097	1140	Soaked 1 day in KOH Dried in air 12 days	488	980	1093
8903	1177	1150	1177	1183		Stood in KOH 5 days	928	1120	1130	Stood in KOH 13 days	718	1087	1100
	18	19	20	21									
8901	1173	1183	1167	1193		Soaked tubes 12 hrs in H_2O. Then dried in air two months.	933	1097		1233	1227	1229	
8902	1147	1160	1143	1180			847	1100	Changed solution	1167	1192	1200	
8903	1135	1150	1133	1163			0	808		1155	1207	1207	

3/6/08

TUBES.

Special Electrolytes.

Charged 6 hrs. @ 200 and discharged @ 200 at different temperatures as noted.

Charged 6 hrs. @ 200 m-a.

Cell #	Electrolyte	#47 C @ 33°C. D @ 24°	#48 C @ 46° D @ 47°	#49 @ 75°	#50 @ 75°	#51 C @ 26° D @ 23°	#52 @ 75°	#53 @ 75°		
8701	21 g. KOH	650	797	813	813	580	874	770		71.3
02	"	612	810	829	757	343	717	723	73.3	49.1
8703	24 g. KOH	602	743	787	770	600	773	747		77.9
04	"	612	757	794	787	604	850	787	77.3	76.7
8705	27 g. KOH	587	698	733	720	590	772	713		81.9
06	"	577	683	720	710	573	760	697	81.2	80.6
8707	21 g. KOH + 2 g. SiOH	533	865	977	927	508	1050	927		54.9
08	" "	490	853	982	930	460	1051	932	52.1	49.4
8709	24 g. KOH + 2 g. SiOH	480	827	950	887	400	1000	873		48.1
10	" "	500	800	967	873	437	1030	907	47.6	50.1
8711	27 g. KOH + 2 g. SiOH	562	752	943	913	543	997	920		59.5
12	" "	533	765	933	908	517	980	913	56.2	57

3/9/08

TUBES

Special Electrolytes.

Loss of charge on standing.
Charged 6 hrs. @ 200 m-a.
Discharged @ 200 m-a.

CELL*	ELECTROLYTE	Discharged immediately	Discharged after 24 hours	
		.54	55	
8701	21 % KOH	770	725	Loss = 5.9 %
02	"	740	693	" 6.4 "
8703	24 % KOH	753	676	" 10.2 "
04	"	778	703	" 9.7 "
8705	27 % KOH	713	643	" 9.9 "
06	"	705	633	" 10.3 "
8707	21 % KOH + 2g SiOH.	930	863	Loss = 7.2 %
08	" "	932	867	" 7 "
8709	24 % KOH + 2g SiOH.	867	780	" 10 "
10	" "	913	850	" 6.9 "
8711	27 % KOH + 2g SiOH	927	853	" 8.1 "
12	" "	917	833	" 9.2 "

4/27/08.

Tube Cells #8334–36. (3" Tubes.) — Bi Group.

Charged 15 hrs. at 300; Discharged at 200.
Have had 162 hrs., and 30 normal runs.

	193	TREATMENT.
#8334		
To 1V.	980	Fe charged against coin
To .5V.	1220	at 100 m-a for 60 hrs.
8335		
To 1V.	1173	Fe reversed against coin
To .5V.	1223	at 200 m-a for 30 hrs.
8336		
To 1V.	1185	Cell charged fully and
To .5V.	1250	then short-circuited.

194	195	196		197	198		199	200
1127	1123	1050	Run 15 hrs. at 200 m-a. Solution not changed	1253	1247	Run 24 hrs. at 200 m-a. Solution not changed.	1243	1250
1250	1223	1200		1275	1297		1267	1277
1212	1187	1163		1228	1273		1245	1292
1245	1224	1205		1247	1283		1253	1303
1245	1223	1198		1323	1347		1327	1363
1267	1253	1242		1331	1363		1338	1377

4/28/08.

Results of Some Temperature Experiments Completed May 18th, 1907.

3" Tubes, Each against 4.7.20 in 21 % KOH.
Charged and Discharged at the same Temperature.

	DATE	RUN NO. 5413-15	RUN NO. 5971-73	TEMP NORMAL. 5414	TEMP NORMAL. 5972	TEMP. VARIED AS INDICATED — 5413	5415	5971	5973	TEMP.
Charged 15 hrs. at 300 Discharged at 150	4/20/07	93	14	950	1097	917	917	1082	1107	78°F
	4/26/07	99	10	950	1100	912	914	1090	1087	100° "
	5/6/07	97	18	947	1093	870	867	880	865	115° "
	5/13/07	103	24	925	1072	670	675	710	702	130° "
	5/16/07	106	27	932	1072	712	695	697	692	145° "
Charged 5 hrs. at 200 Discharged at 150	5/2/07	95	16	723	742	710	718	757	750	74°F
	4/26/07	90	11	725	755	651	657	655	647	100° "
	5/10/07	101	22	705	730	487	482	440	415	115° "
	5/14/07	104	25	736	740	405	385	370	360	130° "
	5/19/07	108	29	692	700	373	400	347	355	145° "

4/29/08.

FES

Sow in Capacity from Runs ... ning in KOH containing Pbi.
Assembled each with four ... tubes in 21 % KOH.
Charge – 15 hrs. at 400. Discharge – at 300.

	1.	2	3	4	TREATMENT	5	6	2nd TREATMENT	6	7	8
8379 F	500	935	1100	1127	Not treated. Not stood 2 days.	770		Washed + dried. Soaked in Conc. HNO3 in pale ash. Dipped in KOH. Washed + dried.			
" FF	500	875	1000	1027		720			917	1080	1080
8568 F	340	680	805	925	Fully charged. Too rap. exposed some in fresh solution – 24 hrs. Put in only 4 hrs + solution to temp.	1067	1077	Repeated former treatment		1092	1070
" FF	325	650	770	880		1037	1040			1030	1040
8569 F	370	770	960	1020	Short-circuited after fully charging.	1240	1200	Fully charged and short circuited twice.		1500	1322
" FF	390	750	942	1022		1280	1257			1560	1300
8570 F	360	735	900	965	KOH changed after 4½ discharge and again after 5½ charge.	650		Same as 8379 above, except washed + dried in KOH first.	847	972	982
" FF	365	720	895	947		660			845	960	980
	9										
8379 FF	1185	1350	1200	1350	1255 .1450 1400 .1440	1452	1500	1500 1500			
8568 F	1150	Changed neg. + discharged at 5 amps for 2 hours.			1347 .1352 1327 .1300	1300	Changed at 5 amps 6 hours. Take chg'd and then neg.		1420	1380	1450 1445 1420
" FF	1100				1300 1317 1295 1270	1275			1360	1370	1380 1415 1400
8569 F	1285	Changed neg. + short circuited 2 times.			1700 1470 1270 1340	1365	1447	1450 1365			
" FF	1300				1725 S.C. 1472 1400	1410	1492	1472 1400			
8570 F	1080	1227	1200	1330	1367 1340 1347 —	Changed neg. 7 hrs. discharged @ 10 amps for 10 min.			1640	1550	1550 1385
" FF	1057	1180	1185	1240	1317 1340 1300 —				1550	1495	1500 1322

⊙ – Monday Runs.

Runs continued under 5/26/08.

5/13/08

TUBES. - 3". (Bi)

Electrolyte — 27 o/o KOH + 2 gr. SiO_2H.

Have had 150 hot runs and 28 normal runs.

Spot Reading

	10		179	180	181		182			183	184						185	186	187
* 8460	1307	150 Hot Runs	850	849	812	Rev. 1 hr. at 200 ma.	903	Rev. 24 hrs. at 200 ma.		857	766	Soaked in H_2O in 27 o/o KOH + 2 gr. SiO_2H Put in fresh 27 o/o KOH + SiO_2H 10 min.	3 dump-then 1 dump				833	800	801
61	1330		803	800	752		843			783	713						776	743	738
62	1287		766	770	683		850			815	716						800	773	766

			188	189	190			191		192	193			194					
8460	Reverse		923	786	796	Change		790		726	743	Rev. 24 hrs. at 200 ma. Put in 130°F.		870	853				
61	24 hrs. at 200		910	750	795	Solution.		760		693	720			867	773		S.O.		
62	ma.		920	766	793			783		713	733			957	850				

5/14/08.

LONG TUBES.

Have had 200 hot runs and 28 normal runs.

		4		225	226	227	229		230	231	232	233	234	235	236	237
10161	21 g. NaOH +	1638		941	1020	1058	1104		1521	1488	1492	1602	1579	S.C.	1546	1542
62	3 g. SiO2	1654	Bomb.	1019	1135	1154	1250		1717	1658	1640	1709	1646	1633	1638	1658
63		1663		917	1052	1062	1133		1750	1702	1679	1731	1688	1675	1677	1704
10173	25 g. NaOH +	1988		1029	1090	1331	1500		1621	1483	1429	1496	Cracked	resp.	and	
74	4 g. SiO2	1971		848	1065	1079	1208		1258	1058	929	1052	about	-cinnitted	,	twice.
75		2021		979	1250	1291	1333		1525	1383	1279	1367				
10176	25 g. NaOH +	1963	200	533	537	491	521		704	575	538	542	Soaked in	H_2O	equal	167.9.E.
77	6 g. SiO2	1992		542	537	525	560		750	608	567	542				
78		2021		542	533	525	548		633	500	404	412				

Flow 24 hrs. at 250 m.g.

10161, 62, 63 } Tube + 7 cc bottle were hot, Rubber helped bottle. Spot bottle Rubber.

10173	1306	1167	1117	Bodily Tipped	
74	875	791	742		
75	1129	985	954		
10176				Bodily Tipped	
77					10177 and
78					7.9.E.

5/18/08.

SHORT TUBES.

Have had 250 hot and 29 normal runs.

		5		280	281	282	283
8045	21 g. KOH +	1137	250 Hot Runs	810	780	786	733
46	29 SiO2	1163		753	786	770	683
47		1127		766	748	751	703
8051	21 g. KOH +	1093		923	857	900	827
52	29 SiO2	1100		807	776	800	746
53		1100		817	800	823	776
8223	21 g. KOH +	1117		841	833	853	814
24	29 SiO2	1117		827	800	841	773
25		1110		823	813	847	776

	284	285	286	287	288	289	
Rev. 24 hrs. at 200 m.-a.	1120	1067	987	973	945	953	Soaked in H2O + quick 47 N.E.
	1028	947	838	807	780	793	
	1030	1010	943	910	887	928	
	1053	1037	980	982	950	987	Rev. 24 hrs. at 200 m.-a. Heat Conv.
	1050	1027	960	933	912	927	
	1037	985	891	867	850	833	
	1110	1047	987	950	913	948	Rev. 24 hrs. at 200 m.-a. Then Change rotation
	1140	1133	1097	1067	1047	1053	
	1167	1130	1073	1050	1013	1000	

8045	See Treatment above	Treated with 1.5 g. KOH. Cleaned Conditio + quick run with new 200 m.	1130	990	840	812	790
46				1040	957	880	870
47		21 g. KOH + 29 SiO2		997	928	923	800
8051				980	947	1000	1012
52				933	918	953	973
53				927	833	882	913
8223				1097	1073	1067	1053
24				1180	1130	1142	1133
25				1197	1120	1120	1120

Treated with 10 g. KOH + 30 g. SiO2 per l. and 122 rotand 4 meth. Then runs regular.

Set stand 4 meth. Then runs regular.

H = Intense runs hot (130°C).

	284	285	286	287	288	289		
8045	1153 H	1133 H	1213 H	1017	1012	890	950	877
46	1138 H	1090 H	1277 H	1062	1067	1007	1047	1000
47	1124 H	1160 H	1180 H	980	955	873	913	860
8051	780	506	550	Rev. 24 hrs at 200 m.-a. against Heat Conv.		1053	Treated with 21 g. KOH + 29 SiO2	1020
52	700	400	400			1047		1010
53	548	360	388			1048		987
8223	1048	958	1040	Rev. 24 hrs at 200 m.-a. Then quick run 21 g. KOH + 29 SiO2		1210	1150	1157
24	1118	1053	1113			1208	1147	1153
25	1103	1028	1093			1212	1137	1140

Continuing 5/15/08

5/20/08

SHORT TUBES.

Electrolyte – 21 g. KOH + 2 g. SiOH + 2 g. $Pb(OH)_3$
Have lived 150 hot and 58 normal runs.

	4	150 Hot Runs	208	209		210	211	212		213	214	215
8457	1177		1100	1112	Soaked in H_2O 2 days, then in 21 g. KOH 1 day, then put in fresh 21 g. KOH to run.	1173	1213	1220	Reversed 24 hrs. at 200 m-a.	1160	1133	1212
58	1173		1025	1050		1173	1173	1182		1275	1257	1273
59	1173		1047	1078		1187	1187	1187		1267	1165	1257
8457	1243	1240										
58	1253	1264										
59	1253	1250										

6/20/09.

SHORT TUBE #8472.

Electrolyte – 21% KOH + 2g SiOH.

Has lived 190 hrs. and 21 normal runs.

		5	190 hrs.	212	213	214				215	216	217			218	219	220
8472		1220		843	833	716	Rev. 24 hrs at 200			1030	833	820	Chg. and S.C. 3 times		726	683	628

		221	222							223	224	225	226		227	228	229
8472		733	700	Soak in H_2O 3 days + in 10% KOH + 30g SiOH per liter. Run in 10% + 30g SiOH						410	453	483	433	Reverse 24 hrs at 200	973	900	902

			230	231	232			233	234	235		236	237	238	239		
8472		Changed sol. for 21% KOH + 2g SiOH.	933	920	860	Rev. 24 hrs at 400 m-a		1098	1020	1023	Soaked free of KOH. Then rev. in alcohol at 7 ull. sol. 20 min at 200 m-a.	1082	1043	1078	1058		

My chemistry 10/11

5/21/08

SHORT TUBE #8100.

Electrolyte — 21% KOH + 2g. SiOH

Has had 250. hot, and 38 normal runs.

Tube O.K.

	4	250 Hot Runs	289	290	291	292	Change neg. and		293	294	295	296	
8100	1093		1030	1157	1167	1138	S.C. once.		1307	1315	1283	1300	S.C.

Tube O.K.

The mass head + S.C. brought it up.

5/21/08.

FE CELLS.

7es from Tube Cell
Assembled with two
Electrolyte – 21%

#8111 – Treated by T.A.E.
new Bi tubes.
KOH + 2g. SiOH.

	1	2	3		4	5	6
4539	342	537	550	Charged neg +	1035	1090	1070
40	460	700	680	S.C. three times	1185	1200	1170

	7	8	9	10	11	12	13
Chg + S.C. twice	1150	1200	1400	1407	1300	1100	1245
at 130° F.	1332	1372	1450	1500	1398	1200	1385

	14	15	16		17	18	19
4539	1235	1330	1210	Charge negative	1400	1360	1500
40	1340	1460	1300	+ S.C. – 3 times	1482	1480	1600

	20	21	22		23	24	25	26
Charged Solution	1190	1100	1265		1300	1410	1500	1460
	1245	1245	1347		1400	1530	1600	1565

C.O.

5/25/08.

FE CELLS

Zes from Tube Cells 10176 and 10178.
Each assembled with four tubes in 21 % KOH.
The electrolyte formerly was 25 % KOH + 6 g. SiO_2 (per 175 cc.)

		1	2	3°	4	5	6	7	8°	9	10	11	12		13	14
10176	F	1170	1130	757	985	995	1040	1120	850	952	1010	1100	1075	Charge neg. and let self heat in air.	1050	1000
"	FF	1100	1130	722	885	970	1060	1095	855	950	1050	1100	1072		1200	1300
10178	F	1045	1125	637	870	960	1000	1020	832	875	980	1060	1052	Charge neg. South in H_2O 3 days. Then let self heat in air.	1270	1115
"	FF	940	1030	720	867	920	970	1005	820	877	980	1015	980		1155	980

		15	16	17°	18	19	Charge Saturday	20	21		22	23	24	25	26°	27
10176	F	1000	1275	875	1050	1187		1430	1500	Charge and	1840	1613	1537	1390	1172	1300
"	FF	1200	1400	1200	1200	1315		1515	1535	S.C. 3 times	1940	1650	1587	1460	1420	1460
10178	F	1085	1280	765	937	1085		1285	1320	changing KOH	1767	1517	1485	1353	1100	1250
"	FF	985	1135	652	767	900		1260	1285	after each.	1690	1450	1380	1270	1127	1240

5/26/08.

FES #4547 + 48.
Tes from Tube Cell —
Each assembled with
The electrolyte formerly

	ELECTROLYTE	Voltage by Voltmeter	6	7	8	9	10
4547	21 g. KOH		570	950	970	770	930
4548	" + 2 g. SiO2H		1000	1250	1195	1000	1070

	17	18	19	20	21	22		23
4547	1240	1165	1265	1355	1232	1260	Change Sol.	1790
48	1260	1100	1192	1200	1075	1100	for 12 g. SiO2H	1370

X = Chg'd 47 hrs. at 400.

	30	31
4547	1220	1550
48	1272	1475

#10177, — Treated by T.A.E.
two tubes. Electrolyte as below.
was 25 g. KOH + 6 g. SiO2H (per 175 cc.)

11	12	13	14		15	16
970	1080	1070	1052	Treated with Ac. at	1185	1165
1050	1100	1180	1080	1.5 amps for 24 hrs.	1200	1100

24	25		26	27		28	29
1400	1885	Reassembled	780	250	Change sol'n	1550	1500
1465	2000	with ½ tubes	650	355	time for 21 g. KOH + 2 g. SiO2H	1300	1370

5/26/08.

FE CELLS.

Continued. See previous runs under 4/29/08.

							○						○						
8379	FF	1507	Changed 21% KOH	1695	1672	1580	1400	1555	1515	Still stood discharged one week.	1100	1400	1200	1300	Changed 21% KOH	1417	1490	Changed Solution for 21% KOH + 2% LiOH.
8568	F	1400		1600	1600	1497	1550	1540	1400		1285	1450	1340	1330		1430	1510	
"	FF	1350		1550	1550	1455	1400	1435	1440		1285	1420	1300	1287		1450	1495	
8569	F	1360		1692	1695	1600	1515	1542	1515		1450	1540	1430	1372		1555	1590	
"	FF	1412		1630	1675	1590	1500	1577	1510		1455	1540	1457	1420		1560	1600	
8570	F	1515		1560	1660	1555	1450	1572	1510		1430	1600	1457	1440		1572	1610	
"	FF	1400		1540	1582	1525	1430	1500	1490		1350	1500	1460	1380		1572	1610	

			○				○	
8379	FF	1747	1700	1700	Charge + S.C. – Twice.	1765	1600	1750
8568	F	1762	1770	1700		1800	1645	1680
"	FF	1770	1770	1650		1760	1600	1622
8569	F	1820	1920	1790		1860	1800	1770
"	FF	1850	1920	1795		1910	1840	1790
8570	F	1877	1880	1790		1980	1810	1800
"	FF	1880	1885	1795		1920	1770	1790

5/27/08

TUBE CELLS.

Electrolyte = 21.0 g. KOH + 2 g. SiO_2H (per 175 cc)
Have had 250 hot and 41 normal runs.
New Fes were put in after 200 hot runs.

	5th Run	Max. Run.	250 Hot Runs	292	293	294		295	296	297	298		299	300	301
8146	1007	1383		990	1000	997	Rev. at 130° F.	990-1363	1233	1207	1210	Charge at 130° F.	1218	1167	1137
47	1013	1400		1023	1027	1033	24 hrs. at 200	1333-	1200	1190	1193	24 hrs. at 200 m-a.	1250	1177	1138
48	1013	1430		1073	1065	1063	m-a.	995-1377	1303	1277	1277	Then charge and run regular.	1327	1233	1190

	302	303	304	305	306		307	308	309	310	311		312	313	314
8146	1067	1042	0990	1043	0958	Reverse	1100	1043	1028	1120	1060	Reverse hi to	1230	1108	1112
47	1073	1055	0993	1037	978	24 hrs. at	1067	1045	1030	1108	1158	carry 48 hrs. at	1175	1090	1083
48	1113	1098	1030	1073	1000	200 m-a.	1087	1045	1047	1113	1077	100 m-a.	1167	1077	1080

	Charged Solution	315	316		317	318	319	320	CONDITION		321	322	
									EHS				
8146		1213	1187	Reverse	1360	1319	1307	1267	Mech. O.K.	Rev. hi to	1370	1273	C.O. =
47		1207	1183	hi to carry	1349	1260	1230	1190	Badly Split	carry 4 days	1293	1147	Split Badly
48		1207	1190	48 hrs. at 100 m-a. hot (130° F)	1267	1107	1060	1013	" "	at 50 m-a.	500	315	

5/27/08.

TUBE CELLS.

Electrolyte — 21 gr. KOH.
Have had 150 hot and 16 normal runs.

	5TH RUN	MAX RUN	150 Hot Runs	167	168	169		
9019	1067	1187		1120	1103	1093	Put in 21 gr. KOH	
20	1113	1233		1127	1108	1100	+ 2 gr. SiOH.	

	170	171	172	173	174	Changed Solution	175	176	177	178
9019	1193	1173	1183	1213	1213		1200	1263	1287	1330
20	1209	1190	1200	1243	1248		1232	1310	1323	1360

	179	180	181	182	183		184
9019	1270	1293	1237	1290	1253	Stood a month	1413
20	1300	1333	1275	1333	1300	discharged	1460

	185	186	187	188	189	190	191	
9019	1360	1407	1412	1407	1373	1420	1430	50 Hot Runs
20	1400	1457	1450	1440	1410	1458	1460	Changed Solution

	242	243	244		245	246	247	
9019	997	1283	1260	Remove Stood with new 7.10	1387	1350	1367	50 Hot Runs
20	1157	1350	1340		1420	1390	1413	Changed Solution

	298	299	300	301	302
9019	1287	1287	1313	1367	1350
20	1333	1343	1397	1447	1430

5/27/08

TUBE CELLS.

Electrolyte – 21 % KOH + 2 g SiOH (per 1.5 cc.)
Have had 200 hot and 25 normal runs.

	5th Run	Max. Run	200 Hot Runs	226	227	228	229	
8508	1173	1353		980	943	952	973	Reverse 24 hrs. at
09	1137	1373		1077	1000	975	977	hot (130°F)

	230	231	232	233	234	235	
Pit to carry							
200 ma-h	1347	1267	1243	1237	1273	1267	Treat with A.C.
	1357	1233	1253	1267	1250	1267	at 1.5 amps for 24 hours.

	236	237	238	239		240	241
8508	1267	1183	1220	1183	Change Solution	1192	1189
09	1233	1177	1237	1210	for 21 % KOH	1209	1165

	242	243	244		245	246	247	248
Rev. Pit to								
carry 24 hrs	1227	1227	1217	Change only	1278	1215	1233	1183
at 200 ma-h	1240	1240	1221	time for 21 % KOH + 2 g SiOH	1293	1223	1247	1200

	249		250	251	252	
		Reverse Pit				Fill with 10
8508	1240	to carry 48 hrs	1430	1247	1290	30 g SiOH per liter
09	1269	at 100 ma-h hot (130°F)	1457	1247	1297	48 hrs. at 100 ma-h 7 hrs. fill with + 2 g SiOH + run

	253	254	255	256	257	258	
% KOH +	Tubes Split						
Reverse							
hot (130°F)	1387	1310	1290	1317	1310	1310	50 Hot Runs
21 % KOH							
carry	1393	1327	1310	1339	1327	1325	Changed Solution

	309	310	311		312	313	314
				Remem-			
8508	1117	1193	1147	bled with	1150	1127	1113
09	673	938	977	New Fer	1097	1073	1063

C.O.
Tubes Split

6/5/08.

FE CELLS

7es from tube cells.
Early assembled with
Have been running with

* 7622, 7623, + 7624.
four tubes in 21 o/o KOH ~~+ 2 g. SiOH~~
Bi tubes in 21 o/o KOH + 2 g. SiOH.

	1	2	3	4 @	5	6			7	8		9	10	11	
7622 F	480	850	825	732	770	797	Reverse 5 hrs		785	900	Reverse	600	800	900	Change Solution
7623 F	380	585	650	572	565	555	at 1000 m-a		600	675	48 hrs. at	450	675	745	for 21 o/o KOH +
7624 F	480	800	860	772	780	775			790	855	100 m-a.	550	775.	870	2 g. SiOH.

	12	13 @	14		15	16		17	18	19	20	21 @	22		23	24
7622 F	1140	1050	1200	Change sol-	1260	1260	Change	1650	1400	1535	1500	1400	1465	Change	1347	1415
7623 F	950	785	890	ution for	1000	1062	and S.C.	1600	1300	1400	1400	1510	1455	solution for	1265	1315
7624 F	1100	1000	1150	33 o/o KOH	1223	1300	3 times.	1660	1350	1495	1470	1322	1400	21 o/o KOH	1322	1385

	25	26	27		28	29			
7622 F	1370	1362	1372	Change	1825	1400	1570	1500	
7623 F	1275	1150	1200	and S.C.	1747	1360	1450	1400	C.O.
7624 F	1375	1342	1360	3 times	1827	1397	1525	1490	

6/3/08

TUBE CELLS

Electrolyte — 21 g. KOH + 2 g. LiOH

Have had 300 hot and 51 normal runs.

Were assembled with new 7es after the 349th run.

	5th Run	Max Run	300 Hot Runs	352	353	354		355	356	357	358		359	360	361	362
7622	1097	1360		1215	1158	1167	Reverse 7yi to can at 1000 m.a. for 5 hrs.	1247	1133	1157	1122	Reverse 7yi to can at 100 m.a. for 48 hrs.	1289	1293	1345	1310
23	1107	1320		1183	1133	1145		1227	1132	1157	1121		1317	1317	1358	1320
24	1117	1337		1189	1148	1157		1215	1120	1148	1113		1307	1300	1351	1313

	363	364	365	Change Solution	366	367		368	369	370	371	372	373	374	375	376	377
7622	1301	1242	1280		1215	1270	Reverse 7yi to can at 50 m.a. for 4 days.	1475	1462	1462	1460	1450	1457	1502	1475	1449	1433
23	1312	1250	1298		1213	1280		1483	1460	1472	1467	1455	1460	1510	1480	1457	1440
24	1303	1243	1297		1213	1270		1470	1457	1470	1463	1449	1453	1500	1475	1447	1433

	50 Hot Runs Changed Solution	428	429	430	Reassembled with new 7es	431	432	433	50 Hot Runs Changed Solution	484	485	486	487	488
7622		1320	1327	1263		1293	1267	1283		1280	1290	1333	1373	1357
23		1303	1333	1283		1307	1283	1303		1207	1217	1217	1247	1223
24		1233	1273	1237		1287	1263	1267		1233	1247	1267	1313	1300

6/15/08

TUBE CELLS.

Electrolyte – 21g. KOH + 2g. Si OH.
These are the ones T.G.E. treated with Pbi – continued from
under 5/18/08.

	302	Stand 3 days	303	304	305	Charged with Solution	306	307	308	309	310		311	312	313	314	315	316
8045	990		955	933	900		982	930	1151	1057	1063	Remove Pbi to cons 48 hrs. at 100 m-a.	1183	1140	" 1263	" 1229	" 1243	" 1149
46	1012		1012	1007	999		1042	1031	1157	1093	1093		1184	1042	" 1225	" 1160	" 1197	" 1093
47	847		883	835	833		893	837	1014	1000	975		1053	1013	" 1217	" 1180	" 1197	" 1113

H – Means Run Hot (130° F.)

	317	318		319	320	321	322	323	324	
8045	1153	1003	Run Pbi to cons 48 hrs wt 100 m-a. hot – 130° F.	1350	1277	1260	1200	1160	1120	Cut Out.
46	967	837		1253	1159	1119	1050	993	953	Tubes are Spent
47	1000	890		1283	1213	1193	1140	1093	1060	

6/15/08

TUBE CELLS.

Electrolyte – 21 % KOH + 2 g. LiOH.

For former runs and treatments see under 5/13/08.

	300	301		302	303	304		305	306	307	308		309	310	Charge Calculation	311
8051	933	913	Refilled	426	360	366	Reversed	233	250	336	320	Charged 2d	260	213		177
52	923	885	with 12 %	433	370	370	4 hrs. at	166	206	281	286	when broke to	213	160		147
53	907	853	LiOH.	436	356	346	200 m-a.	173	213	276	283	21 % KOH + 2 % Li	250	166		147

		312	313	
8051	Reverse	827	746	Cut Out
52	½ to carry	760	626	Tubes Split.
53	½ hrs. at 100 m-a	733	610	

6/15/08

TUBE CELLS.

Electrolyte — 21% KOH + 2% SiOH.
For former runs and treatments see under 5/18/08.

	295		296	297	298	299	300	
8223	1040	Rev. 24 hrs. at 200 m-a. Then put in 21% KOH.	1210	1150	1157	1122	1053	Refilled
24	1113		1208	1147	1153	1127	1063	21% KOH
25	1093		1212	1137	1140	1107	1048	SiOH.

	301	302	303	304		305	306
with	1190	1078	1072	1087	Soaked 21 hrs	1179	1117
+ 2%	1197	1080	1080	1100	at 140°F. Change	1179	1118
	1177	~1057	1059	1077	Solution.	1162	1093

	307	308		309	310	311	312	313
			On nothing change after in 12% KOH	Sim. Fe				
8223	1110	1033		650	941	1023	1113	1090
24	1113	1047		680	870	1062	1145	1127
25	1191	1018	Then removed and discharg. in 21% KOH.	673	874	1030	1113	1100

	314	315		316	317	318
Remainder	1027	1087	Reverse	1233	1165	1120
with new	1050	1100	7½ to Can 4	1230	1167	1120
changed 7 22	1033	1090	dump at 50 m-a	1237	1155	1110

		319	320	321	322	
8223	Rev. 7½	1233	1100	1010	993	Fill with 10% KOH + 30 g SiOH per l. and let stand 4 weeks.
24	to can 8	1233	1107	1020	1007	Then put in 21%
25	dump at 25	1240	1099	997	953	KOH + 2% SiOH.

323	324	325	326	327	328	
953	933	973	847	923	867	
943	953	960	867	933	900	Sent Back to Hopkey
943	928	943	860	920	867	

6/22/08.

TUBE CELLS #8901-03.

Electrolyte — 21 % KOH + 2 % LiOH.

These are new tubes which were used for standing tests.

	26		27	28		29	31
8901	1228	Charged	1297	1280	Charged	1277	1217
02	1200	and Short	1272	1258	and S.C. 3	1253	1198
03	1207	Circuited	1270	1260	times.	1257	1198

	34		35	36	37	38	39	40	41
8901	1198	Charged and	1253	1223	1232	1177	1210	1173	1229
02	1177	S.C. 25 times. Solution changed	1237	1213	1220	1172	1200	1153	1210
03	1177	after 22nd S.C.	1250	1217	1233	1177	1210	1173	1233

7/3/08.

TUBES.

Effect of Temperature on Loss of Charge.

After a normal charge — 7 hrs. at 200 m-a — cells were allowed to stand 48 hours, first at room temperature and then at 35°F., — after which they were discharged regularly at normal temperature.

	Electrolyte	Normal Output	Output after Standing 48 Hrs.	M-A-H Lost	Loss in Per Cent	
	On Standing at Room Temp.					
687 A	21% KOH	813	727	86	10.6	10.8% Av.
" B	"	903	807	96	10.6	
" C	"	900	800	100	11.1	
688 A	21% KOH +	1013	867	146	14.4	15.4% Av.
" B	2% SiOH	1030	870	160	15.5	
" C	"	1043	873	170	16.3	
	On Standing at Temp. of 35°F.					
687 A	21% KOH	787	730	57	7.24	5.8% Av.
" B	"	853	816	37	4.34	
" C	"	857	807	50	5.83	
688 A	21% KOH +	987	923	64	6.48	4.7% Av.
" B	2% SiOH	1017	983	34	3.34	
" C	"	1032	988	44	4.26	

7/3/09

TUBE CELLS. (Long Tubes)
Electrolyte —
Have had 254 hot

21% KOH + 2 g. SiOH.
and 23 normal runs.

	5TH RUN	MAX. RUN		278	279		280	281	282		283	284	285	286	287
			25% KOH												
10/20	1517			1033	1713	Reassembled	1340	1417	1342	Remove 7½	1688	1623	1547	1596	1583
21	1529			1167	1729	with new	1425	1458	1427	to can 4 days	1733	1646	1625	1654	1633
22	1513			1063	1267	charged 7 ds	1431	1450	1429	at 70 m-a	1725	1638	1623	1646	1629

*Run 292 - C + D 7½ Short Tube Pickers

		288	289	290	291		292	293	294	295	296
10/20	Remove 7½	1783	1725	1658	1654	Filled with fresh	1563	1504	1496	1569	1529
21	to can 4 days at 70 m-a.	1833	1775	1717	1704	21% KOH + 2 g. SiOH	1623	1563	1571	1638	1592
22	Left - 130°F.	1810	1758	1700	1690	Set around 4 weeks	1607	1550	1565	1629	1583

Sent Back to Hoopes.

7/3/09

TUBE CELLS. (Song Tubes.)

Electrolyte — 21 % KOH.

Have had 254 hot and 23 normal runs.

	5TH RUN	MAX. RUN		278	279		280	281	282		283	284	285	286	287
10123	1558		254 Hot Runs	890	896	Reassembled	929	908	913	Reverse 7½	977	931	913	950	933
24	1550			992	1000	with new	1054	1042	1025	to cam 4 days	1110	1068	1056	1079	1071
25	1538			1213	1200	changed 7 ss	1258	1244	1225	at 70 m-a	1344	1299	1279	1292	1271

		288	289	290	291	
10123	Reverse 7½	1075	1073	992	988	Filled with 21 %
24	to cam 4 days	1192	1229	1154	1142	KOH + 2 % $Si O_2$.
25	at 70 m-a. Rest – 130° F.	1413	1358	1269	1300	Set stand 4 months

* Run 292 – C + D at Short Tube Rates

292	293	294	295	296	
1000	1021	1063	1150	1079	
1160	1146	1160	1246	1192	Sent Back to Hopkey
1317	1288	1283	1350	1300	

7/6/08

FE CELLS.

Fes from tube — cells # 10120–22.
Electrolyte — 21 % KOH.

	1	2	3		4	5	6	7
10120 F	815	1075	1370	Next run	1375	1460	1610	1600
21 F	885	1070	1360	change 60 ma	1377	1387	1500	1545
22 F	780	940	1200	at 100 ma.	1250	1275	1380.	1400

7/4/08

FE CELLS

Fes from tube cells 10120-22.

Electrolyte — 21 g/o KOH.

	1	2	3		4	5	6	7	
10120FF	880	1242	1375	7 hrs run	1250	1340	1400	1392	Added H_2S, 3 g.
21FF	740	950	1200	change 6 hrs	1206	1375	1432	1300	" " 6 g.
22FF	747	1000	1270	at 1000 m-a.	1245	1375	1425	1300	" " 9 g.

7/6/08

FE CELLS.

Fes from tube. cells 10123-25.
Electrolyte — 21 % KOH.

	1	2	3	4	5	6	7	8
10123 F	962	1200	1470	1582	1665	1655	1575	1645
24 F	900	1130	1350	1462	1570	1587	1420	1560
25 F	1062	1200	1455	1630	1685	1660	1515	1615

C.O.

7/6/08

FE CELLS.

Fes from tube — cells 10123-25.

Electrolyte — 21 % KOH.

	1	2	3	4	5	6	7	8
10123FF	887	1050	1285	1405	1490	1520	1390	1460
24FF	900	1275	1400	1457	1536	1527	1440	1580
25FF	1050	1132	1400	1540	1640	1647	1450	1575

C.O.

7/10/08.

A4 *11.

Output on 1 hour charge at 60 amps

When discharged to, and charged from 1.2V.

Run *43	57 A-H	to 1.2V.
44	55 "	"
45	54 "	"
	166 ÷ 3 = 55.3 A-H	Average

When discharged to, and charged from 1V.

Run *46	52.2 A-H	to 1V.
47	52 "	"
48	52.5 "	"
	156.7 ÷ 3 = 52.2 A-H	Average

7/20/08

TUBE CELLS (new)

		ELECTROLYTE	*1	2		3	4	5	6	7
699	A	21% KOH + 2% KO₃H	1020	1187	* 88% instead KOH 21%	1163	1087	1052	1093	1072
"	B	" "	953	1175		1157	1059	1035	1077	1040
700	A	" 4% KO₃H	960	1193		1177	1115	1080	1115	1090
"	B	" "	1013	1210		1190	1142	1107	1153	1133
701	A	" 6% KO₃H	990	1195		1183	1110	1067	1107	1080
"	B	" "	983	1195		1183	1129	1090	1127	1102
702	A	" 8% KO₃H	980	1170		1183	1107	1070	1110	1087
"	B	" "	970	1133		1120	1087	1065	1093	1083
703	A	" 10% KO₃H	927	653		1100	1033	1010	1053	1020
"	B	" "	903	600		1067	1053	1029	1063	1060

* Solution Changed { 3m As after 2nd Discharge
" Bs " 3rd Charge

7/30/08

TUBE CELLS

Experiment # 704

See history of these cells on the preceding page.

		8	9	10	11	Set Stand & Weeks –	12	13	14	15	16		17	18	19
699 A	$H_2O_2 + NaOH$ + Filled with pure	1170	1170	1200	1214	At Room Temp.	1180	1183	1153	1217	1203	Charged Solution	1247	1233	1250
" B		1189	1147	1180	1203	Discharged	1153	1180	1133	1190	1183		1227	1213	1227
700 A		1185	1169	1199	1217	At Room Temp.	746	1123	1103	1197	1193		1220	1223	1230
" B		1219	1193	1227	1244	Charged	810	1167	1150	1240	1253		1290	1273	1291
701 A		1173	1160	1199	1220	At 130°F.	950	1127	1127	1173	1177		1227	1220	1207
" B		1190	1163	1200	1223	Discharged	987	1140	1134	1190	1193		1227	1220	1213
702 A		1175	1157	1193	1218	At 130°F.	33	1037	1100	1130	1133		1293	1258	1267
" B		1133	1123	1177	1193	Charged	53	1107	1093	1120	1127		1233	1223	1223

7/30/08.

TUBE CELLS.

Experiment #705.

See previous history under 7/20/08

	ELECTROLYTE	7	7 filled both with 10% KOH + 30 g SiOH per l. and let soak 4.	8	9	10	11	12	Charged Solution	13	14	15
703 A	21% KOH	1020	weeks – 'A', normal; 'B', at 130° F.	1057	1070	1057	1120	1113		1143	1160	1173
703 B	" "	1060	7 then put in 21% KOH + 7 g SiOH	1027	1030	1053	1123	1128		1141	1130	1160

10/24/08

Low Capacity E18 Cells.

Cells were filled with 10 % KOH + 30 g SiOH per liter and given two runs in the Testing Department. The first runs here are in this same solution.

Charged 15 hrs. at 30 amps. Discharged at 30 amps.

	1	2		3	4		5	6
14701	71.5	69	Reversed 30 hrs. at 15 amps.	80	78	Put in	77.5	79
15177	54.5	52.5	Same, at temp. of 130° F.	69	67.5	21 % KOH	67.5	70
15321	75	73.5	Set soak 30 hrs. at temp. of 120° F.	77	78	Solution	76.5	75

11/9/08.

TUBE CELLS.

Electrolyte — 21 g. KOH + 2 g. SiOH per 175 cc.
Have had 100 test runs.

	110	111		112	113	114		115	116	117	118
301 A	917	827	Charged 4 hours at 50 m.a.	1040	937	917	Charged 4 hours at 50 m.a. Charged 5 hours	1030	943	910	873
302 A	967	993		1213	1117	1113		1253	1150	1103	1077
303 A	937	1004		1210	1117	1083		1230	1113	1073	1043
304 A	1103	1220		1317	1247	1233		1360	1247	1213	1187
305 A	1223	1250		1320	1253	1240		1357	1257	1213	1200
306 A	1247	1290		1360	1283	1271		1371	1283	1220	1200

	Discharged at 130°			Discharged normal		
	Charged 45 hrs. @ 100	Ditto	15 hrs. @ 300	15 hrs. @ 300	Ditto	Ditto
	119	120	121	122	123	124
302 A	1427	1503	1430	1143	1147	1100
303 A	1367	1490	1427	1117	1090	1060

11/14/08.

T.A.E. TUBE #546 A (Bismuth)

Electrolyte – 21g. KOH + 2g. SiO_2.

Reversed 48 hrs. @ 100 m-a.
Then gave runs as shown below – charging 15 hrs. @ 300 m-a and discharging @ 200 m-a:

Run #1	Normal Test		123	MAH to 1V
" 2	"		53	"
" 3	"		56	"
" 4	"		36	"

June 8 Regular Hot Runs at 130°F.

Run #13	Normal Test		233	MAH to 1V
" 14	"		243	"
" 15	"		256	"
" 16	"		293	"
" 17	Normal Chg., Hot Discharg.		483	"
" 18	"	"	523	"
" 19	"	"	513	"
" 20	Normal Test		323	"
" 21	"		316	"
" 22	"		300	"
" 23	Hot Chg. + Hot Discharg.		430	"
" 24	"	"	516	"
" 25	"	"	513	"

12/4/08.

T.A.E. TUBES #706 A and 714 A.

Electrolyte - 21 % KOH + 2 g. SiO_2.

Tubes were given a half-rate charge and regular discharge, and they were charged at one-half rate again. After this, they were soaked in H_2O 48 hours and then dried.

RUN	CHARGE	DISCHG.	M.A.H. TO 1V. #706	#714	REMARKS
1	——	at 200	847	763	
2	15 hrs @ 30	"	1113	1100	
3	"	"	1133	1107	
4	"	"	1155	1140	
5	"	"	1170	1153	
6	"	"	1170	1157	
7	"	"	1180	1167	

12/14/08.

ABSTRACT OF RESULTS OF "A4" HOT ENDURANCE TEST.

Outputs here given are to 1.V. — after 15 hours charge at 30 amps.
Each figure is the average of two similar cells (except for *210 + 219)
The output on the last of each series of normal runs was taken.

CELLS	ELECTROLYTE	Output Year 7	After 25 Hot 36	After 50 Hot 65	After 100 Hot 122	3rd Year Electrolyte 126	After 150 Hot 173	After 200 Hot 238	3rd Year 21% KOH 243	After Various Treatments 659
*210	10.6 % KOH + 109 g LiOH	167.5	200.7	203.7	186.5	194.5	180	173.5	174.5	176
211 + 14	15 % " 103 g "	168.8	193.2	194	178	183.8	167.7	157.3	163	165
212 + 15	19.2 % " 98 g "	173	196	197.2	177.5	185.2	166.5	155.9	163	164
216	21 % " 15 g "	130.5	129.5	146.5	145.7	148.7	134.5	167.5	168	167
218 + 19	21 % " 30 g "	136	143.2	155.8	162	163.5	148.5	140.3	141.7	142.5
220 + 23	21 % " 45 g "	145.2	158.6	176.3	178	179.2	161.2	152.8	156.5	158.5
224 + 25	21 % " 60 g "	151.8	166.7	180.7	180.1	183.5	166.5	160.5	165.7	166
226 + 28	21 % " 75 g "	157	174	187.3	185	184.2	167.2	163	169.5	174.2
229 + 30	24 % " 45 g "	150.2	161.7	175.3	176.7	179.7	162.7	156.5	161.5	158.6
*388	21 % KOH + 120 g LiOH	211		189					196	
400	" " "	202		191.2					199.7	

* 21 % KOH was put in *210 after 50 hot runs.
° 105 g. LiOH was added to *216 after 100 hot runs.

*724 Zn(OH)2
*724 Zn Oxide

1/7/09

TUBE CELL #9647-J.A.E.
One short tube put up with two
Tes which contain no Mercury.
Electrolyte - 21 g. KOH + 2 g. SiOH.

RUN	CHARGE	DISCHG.	M-A-H to 1V	REMARKS
1	15 hrs. @ 300	Dt 200	1027	
6	"	"	1113	
12	"	"	1112	
	25 Hot Runs. Changed Solution			
43	15 hrs. @ 300	Dt 200	1283	
	25 Hot Runs (Total = 50) Changed Solution			
75	15 hrs. @ 300	Dt 200	1250	
	50 Hot Runs (Total = 100) Changed Solution			
130	15 hrs. @ 300	Dt 200	1060	
	50 Hot Runs (Total = 150) Changed Solution			
187	15 hrs. @ 300	Dt 200	983	
	50 Hot Runs (Total = 200) Changed Solution			
243	15 hrs. @ 300	Dt 200	820	

1/18/09.

FE CELLS *717 – 720.

One regular "A" type Fe agoumping 160 cc of electrolyte.
Cells charged 48 hrs. @ 160 m-a on
Discharge rate – 320 m-a.

			1	2	3	7	8	9	10	11	12	Peculiar S.D.A. 13	14
717	A	21 % KOH	2190	2058	2037	2282	2181	2219	2266	2224	2197	2133	2224
"	B	"	2336	2164	2096	2389	2368	2272	2325	2293	2277	2218	2288
"	C	"	2432	2192	2240	2485	2378	2359	2378	2378	2330	2320	2368
718	A	21 % KOH + 11.4 g SiOH per S	2362	2224	2052	2336	2272	2240	2240	2250	2261	2229	2272
"	B	" "	2452	2208	2080	2389	2346	2346	2346	2378	2373	2373	2410
"	C	" "	2346	2095	1972	2240	2136	2136	2136	2202	2197	2213	2256
719	A	21 % KOH + 9.0 g SiOH per S	1493	See note		—	—	—	1409	1845	2058	2090	2208
"	B	" "	2560	2026	1920	—	—	—	1893	2304	2400	2416	2421
"	C	" "	1093	See note		—	—	—	1386	1831	2042	2106	2208
720	A	Saturated SiOH (120 g per S	12 *	2090	1893	2282	2186	2213	2240	2240	2240	2213	2282
"	B	" "	12 *	1984	1877	2261	2186	2224	2224	2229	2208	2154	2218
"	C	" "	26	1957	1813	2044	2112	2090	2096	2117	2090	1978	2112

Discharged at 800 m-a. Rest in 21 % KOH

* 21 % KOH was put in *720 A-C after the 1st run.

Note – Cells *719 A-C had a peculiar, low-voltage curve. On the runs for which no figures are given, the reading was less than 1.00 V. at the start. Curve was O.K. after the 21 % KOH was put in.

3/17/09.

A4 #404, (Old Soading)
Condensation of Results.

Electrolyte – 21.7 g. KOH + 12.0 g. SiO2H.
Charge and discharge rate: 30 amps.

Runs #1-3	Overcharge tests.	3rd run =	167.5	to 1V.
" 4-15	7-hour charges.	Average	164.2	"
" 16	15-hour charge	—	189	"
" 17	" "	—	192	"
" 18-29	7-hour charges	Average	171.9	"
" 30	15-hour charge	—	199.7	"
" 31-42	7-hour charges	Average	174.6	"
" 43	15-hour charge	—	205	"

(See following page)

4/2/09.

A4 #404, (Old Soaking.)

Electrolyte: 21 g. KOH + 120 g. SiOH.
#734 $Ni(OH)_2$; #19 Nickel 7 tube.

Runs	Charge	Discha.	#404	Remarks
3	15 hrs. @ 30	Out 30	167.5 to 1V.	
4-15	7 hrs. @ 30	"	164.2 "	Average - 12 Runs
16	15 hrs. @ 30	"	189.0 "	
17	" "	"	192.0 "	
18-29	7 hrs. @ 30	"	171.9 "	Average - 12 Runs
30	15 hrs. @ 30	"	199.7 "	
31-42	7 hrs. @ 30	"	174.6 "	Average - 12 Runs
43	15 hrs. @ 30	"	205.0 "	
44-55	7 hrs. @ 30	"	174.1 "	Average - 12 Runs
56	15 hrs. @ 30	"	205.0 "	
57	" "	"	205.0 "	
58-83	7 hrs. @ 30	Out 40	182.6 to .50	26 Runs
84	15 hrs. @ 30	Out 30	207.5 to 1V.	
85	"	"	210 "	
86-111	7 hrs. @ 30	Out 40	179.5 to .5V.	26 Runs
112	15 hrs. @ 30	Out 30	205 to 1V.	
113	"	"	204 "	
114	"	"	205 "	

Note. 7-hour-charge runs up to #55 were made under commercial conditions, i.e., one run per day.

4/2/09.

A4 #466 + 467, (Old Soaking.)

#466 – Electrolyte: 21 g. KOH + 120 g. SiOH.
#467 – " " " 100 g. SiOH.
Both contain #735 $Ni(OH)_2$ and #16A Flake

Runs	Charge	Dischg.	#466	#467	Remarks
3	15 hrs. @ 30	Oct 30	165.0 to 1V.	178.0 to 1V.	
4-15	7 hrs. @ 30	"	165.4 "	166.1 "	Average (12 runs)
16	15 hrs. @ 30	"	196.0 "	193.5 "	
17-28	7 hrs. @ 30	"	175.3 "	171.9 "	Av. (See Spec. Runs)
29	15 hrs. @ 30	"	206.7 "	203.5 "	
30-41	7 hrs. @ 30	"	177.5 "	174.0 "	Av. (See Spec. Runs)
42	15 hrs. @ 30	"	211.2 "	206.0 "	
43-54	7 hrs. @ 30	"	180.2 "	176.2 "	Av. (12 Runs)
55	15 hrs. @ 30	"	212.0 "	208.5 "	
56	"	"	212.5 "	208.5 "	
57-82	7 hrs. @ 30	Oct 40	178.3 to 0.5V.	168.9 to 0.5V.	26 Runs
83	15 hrs. @ 30	Oct 30	199.0 to 1V.	199 to 1V.	
84	"	"	201.0 "	199.5 "	
85	"	"	201.7 "	199.5 "	
86-111	7 hrs. @ 30	Oct 40	174.4 to 0.5V.	169.5 to 0.5V.	26 Runs
112	15 hrs. @ 30	Oct 30	201.5 to 1V.	202.2 to 1V.	
113	"	"	201.5 "	201 "	
114	"	"	205.2 "	205.2 "	

Note. 7-hour-charge runs up to #54 were made under commercial conditions, i.e. – one run per day.

4/2/09

A4 #468, (Old Loading.)

Electrolyte: 8 g/o KOH + 120 g. SiO_2 for 3 runs, — then 25 g/o KOH.
#735 $Ni(OH)_2$; #16A Nickel 7 tube.

RUNS	CHARGE	DISCHG.	#468	REMARKS
5	15 hrs. @ 30	Oct 30	171.0 to 1V.	
6-17	7 hrs. @ 30	"	165.4 "	Average, (12 runs)
18	15 hrs. @ 30	"	192.5 "	
19-30	7 hrs. @ 30	"	170.2 "	Average, (12 runs)
31	15 hrs. @ 30	"	202.5 "	
32-43	7 hrs. @ 30	"	171.3 "	Average, (12 runs)
44	15 hrs. @ 30	"	201.5 "	
45-56	7 hrs. @ 30	"	175.9 "	Average, (12 runs.)
57	15 hrs. @ 30	"	203.5 "	
58	"	"	207.5 "	
59-84	7 hrs. @ 30	Oct 40	165.2 to .5V.	26 Runs
85	15 hrs @ 30	Oct 30	201.5 to 1V.	
86	"	"	201.0 "	
87	"	"	199.2 "	
88-113	7 hrs. @ 30	Oct 40	164.9 to .5V.	26 Runs
114	15 hrs. @ 30	Oct 30	206.5 to 1V.	
115	"	"	204.2 "	
116	"	"	207.7 "	

Note. 7-hour-charge runs up to #56 were made under commercial conditions, i.e., — one run per day.

4/13/09

A4 #478-480, (New Soaking.)

#478 - Electrolyte: 214 g. KOH + 90 g. SiO$_2$.
479 - " " 105 g. SiO$_2$.
480 - " " 120 g. SiO$_2$.
In all: #739 Li(OH)$_2$; #28 Kg + 203 Kg 7 lake.

Runs	Charge	Discha.	#478	#479	#480	
8	15 hrs. @ 30	Oct 30	181 to 1V.	174.5 to 1V.	182.7 to 1V.	
9-24	7 hrs. @ 30	"	165.7 to .5V.	170.7 to .5V.	177.8 to .5V.	16 Runs.
25	15 hrs. @ 30	"	204.2 to 1V.	200 to 1V.	201.5 to 1V.	
26	"	"	198.5 "	196.7 "	200 "	
27	"	"	204.3 "	200 "	201.5 "	
28-44	7 hrs. @ 30	Oct 40	164.5 to .50	170.1 to .50	175.8 to .50	17 Runs
45	15 hrs. @ 30	Oct 30	199 to 1V.	198 to 1V.	200 to 1V.	
46	"	"	196 "	195.5 "	197 "	
47	"	"	200.5 "	200 "	202.5 "	
48-64	7 hrs. @ 30	Oct 40	165.1 to .50	173.2 to .50	178.1 to .50	17 Runs
65	15 hrs. @ 30	Oct 30	195.2 to 1V.	194.7 to 1V.	194.7 to 1V.	
66	"	"	204.5 "	204 "	203.5 "	
67	"	"	203.5 "	205 "	206.2 "	
68-92	7 hrs. @ 30	Oct 40	168.6 to .50	175.7 to .50	177.9 to .50	25 Runs
93	15 hrs. @ 30	Oct 30	197 to 1V.	192.5 to 1V.	180 to 1V.	
94	"	"	196.5 "	193.5 "	190.5 "	
95	"	"	198 "	193.5 "	189 "	
96-120	7 hrs. @ 30	Oct 40	168.1 to .50	180.1 to .50	186 to .50	25 Runs
121	15 hrs. @ 30	Oct 30	200 to 1V.	197 to 1V.	190 to 1V.	

Runs	Charge	Dis.	#478	#479	#480	
122	15 hrs. @ 30	Oct 30	202.5 to 1V.	200 to 1V.	200 to 1V.	

4/18/09.

A4 #481-483, (New Soaching.)

Electrolyte: 80% KOH + 120 g. SiOH for 3 runs, — then 25% KOH.
#739 $Ni(OH)_2$; 28 Ni + 203 Bi 7 hole.

Runs	Charge	Disch.	#481	#482	#483	
6	15 hrs. @ 30	Oct 30	166.2 to 1V.	167.8 to 1V.	167.7 to 1V.	
7-24	7 hrs. @ 30	"	168 to .50	170.4 to .50	167.4 to .50	18 Runs
25	15 hrs. @ 30	"	199.2 to 1V.	190 to 1V.	188.5 to 1V.	
26	"	"	192.2 "	193.2 "	191.5 "	
27-42	7 hrs. @ 30	Oct 40	169 to .50	170.3 to .50	168.7 to .50	16 Runs
43	15 hrs. @ 30	Oct 30	197.5 to 1V.	199 to 1V.	197.5 to 1V.	
44	"	"	197.2 "	199.2 "	196.5 "	
45	"	"	197.2 "	199.2 "	197.2 "	
46-61	7 hrs. @ 30	Oct 40	169.7 to .50	169.4 to .50	167.1 to .50	16 Runs.
62	15 hrs. @ 30	Oct 30	195 to 1V.	191.2 to 1V.	192.2 to 1V.	
63	"	"	194.7 "	195 "	194 "	
64	"	"	198 "	198 "	197.5 "	
65-89	7 hrs. @ 30	Oct 40	171.4 to .50	172.2 to .50	168.8 to .50	25 Runs
90	15 hrs. @ 30	Oct 30	199.2 to 1V.	197 to 1V.	197.7 to 1V.	
91	"	"	202 "	199.5 "	200 "	
92	"	"	202.5 "	200.7 "	199.7 "	
93-117	7 hrs. @ 30	Oct 40	169.1 to .50	171 to .50	169 to .50	25 Runs
118	15 hrs. @ 30	Oct 30	194.5 to 1V.	193.2 to 1V.	195 to 1V.	
119	"	"	200 "	198.7 "	199.5 "	
120	"	"	205 "	204 "	203.7 "	

4/14/09

A4 #484-486, (New Soaking)

Electrolyte: 210 g KOH + 120 g LiOH.
#739 $Ni(OH)_2$; #28 Ni + 203 Bi Flake

Runs	Charge	Dischg	#484	#485	#486	
5	15 hrs. @ 30	Dt 30	173.5	175.0	173.5	
6-17	7 hrs. @ 30	Dt 40	174.1	173.8	170.0	12 Runs
18	15 hrs. @ 30	Dt 30	189.0	189.0	186.5	
19	"	"	188.5	190.0	188.0	
20	30 hrs. @ 15	"	202.5	206.5	202.5	(P.3.)
21	"	"	198.7	200.0	198.0	
22	15 hrs. @ 30	"	200.0	200.0	199.5	
23	"	"	198.5	199.5	197.5	
24	"	"	209.2	209.5	208.0	(P.3.)

Sent cells to General Electric Company

Note. Output to 1V. is given on normal-rate runs (30 amp), but output to .5V. on runs at higher rates.

4/14/09

A4 #487-489. (Zinc-Soaking)

Electrolyte: 21 g. KOH + 120 g. SiOH.
#739 $Zn(OH)_2$; #9 ∓ lake.

Runs	Charge	Dischg	#487	#488	#489	
5	15 hrs. @ 30	Out 30	169.0	168.5	170.0	
6-17	7 hrs. @ 30	Out 40	165.1	163.3	165.7	12 Runs
18	15 hrs. @ 30	Out 30	183.0	180.0	183.0	
19	"	"	184.0	180.0	184.0	
20	30 hrs. @ 15	"	200.0	196.5	200.0	(P.D.)
21	"	"	194.5	192.0	194.0	
22	15 hrs. @ 30	"	195.0	193.0	193.7	
23	"	"	192.5	190.7	192.5	
24	"	"	205.0	203.0	205.0	(P.D.)
	Sent cells to General Electric Co. – except #488.					
25	15 hrs. @ 30	Out 30		197.0		(P.D.)
26	"	"		196.5		
27-64	7 hrs. @ 30	Out 40		163.5		38 Runs
65	15 hrs. @ 30	Out 30		175		
66	"	"		196.7		
67	"	"		195.5		

Note. Output to 1V. is given on normal-rate runs, (30 amp.), but output to 5V. on runs at higher rates.

5/5/09

Test of Electrolyte in A4 Cells after 5 months of service in a truck of the Tonograf Co.

A4	#231	sp. gr.	1.152	@ 22°C.
"	232	"	1.142	"
"	376	"	1.153	"
"	380	"	1.180	"
"	387	"	1.147	"
"	390	"	1.183	"

Electrolytes:

#231 + 232 had first 21 % KOH + 15 g. SiOH; then saturated SiOH; then two changes of 21 % KOH.

#376 – 21 % KOH + 120 g. SiOH, then 21 % KOH straight.

#380 – 21 % KOH + 120 g. SiOH

#387 – " " " "

#390 – four changes of 21 % KOH + 45 g. SiOH per liter.

These cells have run 2216 miles in the truck.

Analyses by Spithe:

Cell #376 = 15.09 % KOH ; 1.08 % SiOH

" #387 = 13.43 % " ; 1.65 % "

5/6/09.

Test of Electrolyte in A4 Cells which have been in a Tonograf Co. truck since June 16, 1908 — 10 ½ months.

A4	#82	sp. gr.	1.163	@ 27°C.
"	108	"	1.137	"
"	110	"	1.163	"
"	111	"	1.166	"
"	125	"	1.143	"
"	128	"	1.148	"

Original Electrolyte: 21 % KOH + 15 g SiOH. This was changed once before battery was put in the truck.

These cells have run 5302 miles in the truck.

COMPARISON

A4 Cell with 100 g. SiOH in 21 % KOH.
Small Tube Cell with 21 % KOH + 2 g. SiOH sol.

	A4 CELL	SMALL CELL
Proportion of Fe to Ni	3 : 1	2 : 1
Electrolyte per Tube	1125 cc.	240 cc.
SiOH per Tube	33 g.	2.7 g.
SiOH Concentration	75 g. per l.	112 g. per l.
Charge Rate for 15 hrs.	30 amps.	4.5 amps.
Charge Temperature	90 – 105°	75 – 85°
Discharge "	90 – 105°	80 – 90°
Solution Renewed	225 runs.	50 runs

6/25/09.

Runs of Tube Cells #475 A-477 A (B1), and #697 A-C, made in Connection with Experiment #903.
A-H to IV. on Normal Temperature Runs only, is given.

Run #475	No. #697	Charge	Dischg.	#475 A	#476 A	#477 A	#697 A	#697 B	#697 C	
205	109	15 hrs. @ 300	Ot 200	1507	1517	1523	1271	1240	1270	
206	110	" "	"	1500	1517	1517	1267	1237	1263	
207	111	" "	"	1480	1523	1523	1291	1267	1283	
208	112	7 hrs. @ 200	"	1147	1145	1127	1040	1033	1037	
209	113	" "	"	1158	1162	1167	1028	1012	1012	
210	114	" "	"	1160	1173	1170	1097	1071	1067	Prev. Table
211	115	" "	"	1140	1153	1150	1068	1050	1033	
212	116	" "	"	C-Cold. B-Norm.	C-Norm. B-Cold.	1110	C-Cold. B-Norm.	C-Norm. B-Cold.	1010	
213	117	" "	"			1101			1000	
214	118	" "	"			1090			998	
215	119	" "	"	1077	1151	1100	1000	1033	974	
216	120	" "	"	1170	1174	1183	1101	1074	1081	Prev. Table
217	121	" "	"	1147	1153	1157	1091	1053	1067	
218	122	15 hrs. @ 300	"	1563	1577	1580	1420	1353	1380	
219	123	" "	"	1583	1594	1600	1420	1360	1390	

9/13/09.

Experiments on Charging by Voltage.

A4 Cell #646,
(Results corroborated by tests of cells #643 and 775 which were in series.)
Charged at 30 amp's until voltage exceeded 1.78 and remained practically constant, increasing not more than .005 V. in 30 minutes.

Discharged 150 A-H, each run:

Run #118	Charged	192.5	A-H	to constant V.	
" 119	"	185.0	"	"	
" 120	"	195.0	"	"	
" 121	"	180.0	"	"	
" 122	"	180.0	"	"	
" 123	"	187.5	"	"	
" 124	"	182.5	"	"	
" 125	"	185.0	"	"	
		185.9	"	Average	

A-H Output 150.0 / " Input 185.9 = 80.7 % Efficiency

Charge exceeds discharge by 23.9 %

Discharged 100 A-H, each run:

Run #126	Charged	135	A-H	to constant V.	
" 127	"	127.5	"	"	
" 128	"	142.5	"	"	
" 129	"	137.5	"	"	
" 130	"	132.5	"	"	
" 131	"	125.0	"	"	
		133.3	"	Average	

A-H Output 100.0 / " Input 133.3 = 75 % Efficiency

Charge exceeds discharge by 33.3 %

Cell, when charged 7 hours at 30 amp's and discharged at 30 amp's to 1 V., gives an average output of 173 A-H:

A-H Output 173.0 / " Input 210.0 = 82.4 % Efficiency

Charge exceeds discharge by = 21.3 %

11/1/09.

Wagon Performance
with Edison and with Lead Battery Equipments of Equal Weight.
Battery capacities figured on actual basis, i.e. –
Lead, 8 Watt-hours per pound
Edison, 15 " " " "

Wagon weights based on Sommers standards.

Wagon Capacity	Total Weight Empty	Total Weight Loaded	Battery Weight	W-H Capacity Lead	W-H Capacity Edison	W-H per Ton-Mile	W-H per Wagon-Mile Empty	W-H per Wagon-Mile Loaded	Miles per Chg. – Lead Empty	Miles per Chg. – Lead ½ Load	Miles per Chg. – Lead Full Load	Miles per Chg. – Edison Empty	Miles per Chg. – Edison ½ Load	Miles per Chg. – Edison Full Load
350	2100	2450	950	6800	12750	110	115.5	134.7	58.8	54.6	50.4	110.3	102.4	94.6
1000	3050	4050	1200	9600	18000	100	152.5	202.5	62.9	55.1	47.4	118.0	103.4	88.9
3000	3850	6850	1200	9600	18000	90	173.2	308.2	55.4	43.2	31.1	103.8	81	58.3
6000	5300	11300	1700	13600	25500	80	212.0	452.0	64.1	47.1	30.1	120.2	88.3	56.4

FEB 17 1910

COMMERCIAL TYPES OF THE LALANDE CELL

Abstract of Data from Tests made subsequent to March 1st, 1909.

A4 CELLS #643, 646, + 775.

Tabulation of Results Obtained on 7 cells #171 - 229, - changing at different rates for various lengths of time, and discharging at 30 amps to one volt.

Each ampere-hour figure given is the average of all these cells on two or more runs.

RUNS	CHARGE	A-H INPUT	AV. OUTPUT	
174-176	4 hrs. @ 60	240	167.9	
171+172	3 " "	180	148.2	
177-179	2 " "	120	111.2	
180-182	1 " "	60	57.5	+ Green
183+184	$5\frac{1}{2}$ hrs. @ 50	260	177.1	
186+187	4 " "	200	158.9	
188+189	3 " "	150	134.1	
190-192	2 " "	100	94.6	✓ Violet
193+195	7 hrs. @ 40	280	185.4	
196+198	$5\frac{1}{2}$ " "	210	172.1	
199-201	4 " "	160	144	
202-204	3 " "	120	114.8	• Red

RUNS	CHARGE	A-H INPUT	AV. OUTPUT	
205+206	10 hrs. @ 30	300	192.5	
208+209	7 " "	210	174.6	
210-212	$5\frac{1}{2}$ " "	165	150.7	
213-217	4 " "	120	114	x Black
218+220	16 hrs. @ 20	320	194.5	
221+222	$10\frac{1}{2}$ " "	210	178.6	
223-225	$8\frac{1}{4}$ " "	165	151.1	
227+229	6 " "	120	109.6	• Yellow

JUN 13 1910

A4 CELL # 478.

Output at 30 amp's on 15 hr. charge @ 30.

DATE	RUN	AMP.-HR. OUTPUT To 1V.	To 0.9V	To .5V	OUTPUT IN PER CENT To 1V.	To 0.9V	To .5V
3/5/09	5	178.5	186.0	190.0	100.0	100.0	100.0
3/24/09	27	202.0	204.5	209.7	113.2	111.0	110.3
4/8/09	47	200.5	204.5	209.2	112.3	109.9	110.1
4/23/09	67	203.5	208.0	214.0	114.0	111.8	112.7
5/13/09	95	198.0	204.7	212.7	110.9	110.1	112.0
6/7/09	122	202.0	208.0	215.5	113.2	111.8	113.3
7/14/09	176	188.5	195.3	203.2	105.7	105.0	106.8
9/11/09	251	194.2	206.5	220.0	108.8	111.0	115.8
		New Solution: 21 g. KOH + 22.5 g. LiOH per l.					
9/13/09	258	205.0	215.2	226.5	114.8	115.7	119.2
10/22/09	311	188.0	203.3	219.5	105.3	109.3	115.6
12/9/09	364	181.5	200.0	222.0	101.7	107.6	116.8
1/14/10	416	192.0	209.5	228.0	107.6	112.1	120.0
2/22/10	470	190.0	203.0	219.0	106.4	109.2	115.2
		New Solution: 21 g. KOH + 11.2 g. LiOH per l.					
3/1/10	477	198.0	212.0	229.0	110.9	114.0	120.5
4/6/10	531	191.5	203.0	219.5	107.3	109.2	115.6
5/7/10	583	181.5	195.0	215.5	101.7	104.9	113.4

JUN 13 1910

A4 CELL #468.

"Old" coating; special forming treatment.

DATE	RUN.	AMP.-HR. OUTPUT			OUTPUT IN PER CENT		
		TO 1V	TO 0.9V	TO 0.5V	TO 1V	TO 0.9V	TO 0.5V
2/12/09	5.	171.0	177.5	183.0	100.0	100.0	100.0
2/27/09	19	192.5	198.6	204.0	112.7	111.9	111.5
3/15/09	31	202.5	208.0	212.5	119.3	117.2	116.2
3/30/09	44	201.5	204.2	208.5	117.8	115.2	113.9
4/15/09	57	203.5	207.0	211.0	119.0	116.7	115.3
5/7/09	87	199.2	202.2	206.0	116.5	114.0	112.7
5/29/09	115	204.2	208.0	211.7	119.4	117.2	115.8
7/7/09	168	194.7	197.7	203.0	113.8	111.3	110.9
8/17/09	225	192.5	198.5	205.0	112.6	111.9	112.0
		New solution: 21 g. KOH + 11.2 g. SiO_2 per l.					
8/24/09	232	193.0	198.0	203.0	112.9	111.7	110.9
10/1/09	285	201.5	208.5	215.0	117.8	117.5	117.5
11/6/09	336	203.2	210.0	216.5	118.8	118.3	118.3
12/18/09	390	196.7	206.2	215.0	115.0	116.2	117.5
1/29/10	445	190.0	200.5	214.0	111.1	113.0	116.9
		New solution: 21 g. KOH + 11.2 g. SiO_2 per l.					
2/3/10	451	197.5	207.2	218.0	115.5	116.7	119.2
3/11/10	503	206.5	215.0	225.0	120.7	121.1	123.0
4/18/10	558	195.0	205.7	219.5	114.0	115.9	119.9
5/27/10	612	193.2	203.5	218.5	113.0	114.6	119.3

5/15/07.

Jalbo, Sol #1. Chg'd @ 200 m-a. Dis. @ 150.

	Chg'd 1 hr.	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	10 hrs
5398	200	395	515	620	723	780	856	979
99	200	377	517	640	735	810	857	922
5400	197	377	517	632	723	805	852	937
5401	197	386	537	663	768	845	898	947
02	190	386	537	666	768	850	902	955
03	195	386	535	663	763	842	886	947
5404	195	372	522	635	725	780	845	922
05	202	385	527	638	728	800	843	915
06	200	380	522	625	724	775	837	908
5407	195	360	492	600	697	774	840	957
08	190	360	510	625	725	813	878	975
09	190	367	510	635	740	825	866	995
5410	195	382	535	657	750	820	898	921
11	202	375	535	657	750	823	862	897
12	200	386	537	668	761	823	870	910
5413	200	390	515	325	725	800	650	750
14	200	387	520	677	777	856	907	950
15	192	385	542	671	766	827	868	900
5416	192	385	535	647	747	816	860	893
17	190	385	537	660	758	825	870	920
18	190	385	537	655	747	823	863	905
5419	192	381	537	673	778	857	910	952
20	192	381	540	670	772	848	899	947
21	192	385	542	670	771	847	892	947

Corrected for temp. & pressure	50 Hot Runs	Chg'd 6 3/3 hrs @ 150	Chg'd 5 hrs @ 200	Chg'd 4 hrs @ 250	Chg'd 3 1/3 hrs @ 300
977		723	652	640	595
957		700	622	622	562
975		725	660	642	598
1006		777	715	700	657
992		720	650	640	597
980		735	672	655	607
955		716	656	645	610
958		757	688	675	632
958		706	662	643	600
990		692	632	617	560
1013		716	640	622	580
1031		717	650	630	586
960		717	670	667	633
946		738	682	681	650
961		725	677	673	645
962		708	663	661	633
995		715	663	660	630
950		723	672	671	645
942		715	658	657	617
962		725	675	670	636
963		716	666	667	631
1001		743	687	685	650
990		756	697	695	662
990		732	682	677	647

This lot of Jalbo was not tested for efficiency at 5 hrs

Rates of change, when new

After 50 hot runs, the capacity, when 100 m-a

is just as different rates, as on following.

Set #1.
After 100 Hot Runs

	Conversion on Overall Range	Consumption Corr. 7½ % Overrun	Charged 6⅞ Run @ 150	5 Run @ 7.00	4 Run @ 7.59	3½ Run @ 8.09	5 Run Corr. Corr. 7½ % Overrun
5398	952	917.3	695	617	567	542	85.4
99	925	916.6	667	597	542	507	81.3
5400	942	916.6	691	612	558	522	84.8
5401	972	916.7	691	500	612	547	65.1
02	955	916.3	675	597	552	510	77.8
03	957	917.7	687	617	570	527	80.9
5404	940	918.4	700	625	581	548	86.2
05	937	917.8	693	620	571	531	85.2
06	937	918.8	700	625	580	548	86.4
5407	942	918.3	637	567	507	456	80.6
08	947	918.3	662	592	550	522	81.7
09	947	918.8	672	595	521	467	79
5410	937	917.6	660	613	587	572	81.7
11	929	917.2	691	625	600	570	82.2
12	925	916.2	691	625	622	585	82.1
5413	Used for Special Tests.						
14							
15							
5416	917	917.4	700	575	600	555	76.9
17	955	919.2	617	622	637	595	82.1
18	940	917.6	682	622	600	572	83.3
5419	945	916.4	705	652	678	600	83.4
20	960	916.9	720	667	637	605	86.4
21	947	917.9	712	652	625	595	84.6

After 150 Hot Runs

	Conversion on Overall Range	Consumption Corr. 7½ % Overrun	Charged 6⅞ Run @ 150 Minus	5 Run @ 7.00	4 Run @ 7.59	3½ Run @ 8.09	5 Run Corr. Corr. 7½ % Overrun
5398	930	915.1	640	580	518	473	80.2
99	931	917.3	648	581	528	477	79
5400	925	914.8	627	543	490	442	75.1
5401	945	914	607	638	588	543	83
02	937	914.5	637	562	516	477	73.3
03	942	914.1	662	606	551	512	79.4
5404	947	919.2	685	625	583	536	86.2
05	946	918.8	700	652	605	557	89.6
06	925	916.6	677	620	580	531	85.7
5407	890	899	567	501	455	403	71.8
08	975	912	665	600	545	496	82.8
09	932	908	632	560	507	473	75.6
5410	887	914	640	610	578	525	81.4
11	897	918	680	630	601	568	84
12	887	913	667	657	613	577	86.4
5413	Special Tests						
14							
15							
5416	902	915.8	672	643	610	565	86
17	898	913.3	687	641	605	562	84.6
18	925	916.1	677	630	595	562	84.3
5419	912	911	705	671	630	591	86.3
20	925	914	687	650	609	552	84.1
21	950	916	702	673	632	597	87.2

Set #1.
After 200
Hot Runs

	Concentration of Granules	Granulation Cycle % of Original	Concentration of 6½ hrs @ 150	5 hrs @ 200	4 hrs @ 250	3½ hrs @ 300	5 hrs Gran Cycle % of Original	
5398	880	90.1	555	485	450	402	74.4	
99	907	94.8	665	585	552	501	94	
5400	910	93.4	657	575	547	500	81.1	
5401	935	93	707	620	597	547	84.7	
02	900	90.7	655	553	528	475	85	
03	900	91.9	667	580	542	512	84.3	
5404	932	97.6	700	616	597	545	93.8	
05	913	95.3	692	625	595	562	89.9	
06	902	94.3	667	571	550	552	88.7	
5407	920	92.9	630	535	502	455	88.6	
08	920	90.7	662	572	545	503	88.4	
09	905	87.7	650	562	530	490	88.5	
5410	845	88	707	635	612	588	95.8	
11	855	90.4	707	640	615	587	92.8	
12	842	87.6	710	637	615	590	96.1	
5413	850	88.3	712	665	640	610	100.3	100 Hot 51 Normal 65 Short Runs
14	955	95.5	782	718	675	642	100.2	
15	845	88.9	685	625	602	565	88	
5416	872	92.6	700	629	603	570	99.4	
17	867	90.1	715	652	617	591	94.7	
18	882	91.7	711	632	615	580	94.9	
5419	888	88.7	727	658	640	602	94.7	
20	922	93.1	747	655	637	587	97.9	
21	922	93.1	725	662	637	605	97.1	

Tubes, Set #2.

Charged @ 200 m-a. Plate @ 150

	Charged 2 hrs	3 hrs.	4 hrs.	5 hrs.	6 hrs.	7 hrs.	10 hrs.
5586	377	505	607	712	787	861	997
87	376	513	618	721	798	867	998
88	367	500	602	700	772	842	980
5589	372	513	616	707	772	827	925
90	377	527	631	718	787	845	931
91	377	525	630	735	791	850	940
5598	375	508	610	717	795	873	1032
99	375	511	615	722	806	882	1040
5600	368	500	602	702	770	843	995
5601	385	548	667	775	871	942	1080
	395	541	601	768	861	8395	1071
02	385	537	657	765	858	925	1075
03	385	537	660	765	857	922	1058
5604	352	492	587	687	735	806	922
05	370	495	597	696	765	836	966
5606½	349	492	567	665	700	760	840
5609	387	525	637	738	818	878	970
10	387	540	647	746	822	881	952
11	387	540	655	753	832	887	950

	Compensation out (Gradually) 7 hrs	Charged 6⅔ hrs @ 150	5 hrs. @ 200	4 hrs @ 250	3⅓ @ 300
1111		782	712	670	618
1111		787	721	685	640
1092		770	700	662	620
1072		765	707	687	660
1030		770	718	695	657
1035		785	735	707	660
1181		790	717	666	622
1185		795	722	680	637
1155		770	702	666	607
1175		840	775	750	721
1174		836	768	740	710
1182		831	765	730	700
1166		825	765	500	777
1052		748	687	650	617
1082		768	696	657	620
955		702	665	605	570
985		805	738	698	667
945		813	746	721	687
972		810	753	723	697

Set #2. After 50 Hot Runs.

	Contraction on Outside Bowl 4 Hot Runs	Contraction on Outside Bowl 7½ % Overgauge	Clearance 6 3/8 Bore @ 150 Hot Runs	5 Bore @ 200	4 Bore @ 250	3 3/8 Bore @ 300	5 Bore Over Gage 7½ % Overgauge
5586	890	80	592	566	500	473	79.5
87	955	85.9	625	590	530	492	81.9
88	937	85.8	615	578	525	485	82.6
5589	842	82.3	562	547	498	478	77.4
90	867	83.7	590	578	535	510	80.5
91	892	86.2	679	612	568	540	83.3
5598	1080	91.4	667	620	567	512	86.5
99	1075	90.8	670	636	572	532	88
5600	900	77.9	555	532	465	450	74.4
5601	Having Special Tests.						
02							
03							
5604	842	80	527	512	462	448	74.6
05	847	80.2	550	523	475	450	75.1
5606½	825	86.4	537	535	485	460	80.5
5609	947	98.2	687	650	595	552	88.1
10	950	94.4	690	655	611	571	87.8
11	922	94.8	671	635	587	563	84.4

5/18/07

After 100 Hot Runs.

	Contraction on Outside Bowl 4/13/07	Contraction on Outside Bowl 7½ % Overgauge	Clearance 6 3/8 Bore @ 150 Hot Runs	5 Bore @ 200	4 Bore @ 250	3 3/8 Bore @ 300	5 Bore Over Gage 7½ % Overgauge
5586	892	80.3	572	495	452	427	69.5
87	857	77.1	545	497	456	428	69
88	901	82.4	582	517	477	437	73.9
5589	792	77.4	515	482	445	419	68.2
90	847	82.3	567	510	495	442	71.1
91	880	85	580	533	505	470	72.4
5598	1010	85.4	595	531	485	445	74
99	975	82.3	595	535	488	452	74.1
5600	800	69.3	472	417	377	350	59.4
5601							
02							
03							
5604	787	74.8	520	457	430	397	66.5
05	807	74.5	522	462	432	395	66.4
5606½	745	78	492	447	420	392	67.3
5609	970	98.5	667	610	567	520	82.6
10	960	99.5	680	622	582	530	83.4
11	912	93.8	645	592	560	505	78.7

Set #2. After 150 Hot Runs.

	Capacity in Ounces	Capacity in % of Original	Charge of 6 3/4 hrs @ 150 hrs	5 hrs @ 200	4 hrs @ 250	3 1/3 hrs @ 300	5 hrs Over Charge % of Original
5586	816	73.4	568	495	447	410	69.5
87	805	72.4	567	497	456	425	69
88	810	74.1	565	492	435	400	70.3
5589	672	65.7	482	447	410	380	63.3
90	807	78.3	585	542	510	472	75.6
91	810	78.3	591	537	487	450	73.1
5598	947	80.2	600	535	470	432	74.6
99	967	81.6	667	582	517	487	80.6
5600	787	68.2	525	467	420	395	66.5
5601	1067	90.7	670	615	552	510	79.3
* 02	1135	95.9	722	670	625	580	87.6
03	1112	95.5	727	675	625	582	88.2
5604	715	67.9	510	457	417	395	66.5
05	772	71.3	545	487	432	397	70
5606½	657	68.8	470	437	407	370	65.8
5609	896	91	662	588	542	497	79.7
10	921	95.4	650	580	517	478	77.8
11	860	88.4	642	572	522	485	76

* 5601–03 Same lead only, 141 ounces altogether – 74 of which were 2nd. Were gives efficiency with no different consistency of 71% and 74.0%. Your running very near 71 and 74.0%.

After 200 Hot Runs.

	Capacity in Ounces	Capacity in % of Original	Charge of 6 3/4 hrs @ 150 hrs	5 hrs @ 200	4 hrs @ 250	3 1/3 hrs @ 300	5 hrs Over Charge % of Original
5586	812	73.1	562	488	445	402	68.5
87	795	71.6	555	480	440	400	66.5
88	795	72.7	553	470	437	390	67.2
5589	690	67.4	490	440	422	377	62.2
90	780	75.7	577	523	495	462	72.8
91	770	74.4	550	488	455	417	66.4
55 98	952	80.6	605	527	480	432	73.5
99	972	82.1	650	567	517	467	78.5
5600	796	68.9	537	466	430	385	66.4
5601	1075	91.5	700	615	565	525	79.4
02	1070	90.4	675	612	572	530	80.1
03	1092	93.8	707	642	602	550	84
5604	725	68.8	530	475	442	415	69.1
05	755	69.7	552	482	452	407	69.3
5606½	697	73	487	417	425	405	67.8
5609	855	86.8	642	575	537	492	78
10	883	91.5	645	570	532	487	76.4
11	855	87.9	632	552	512	475	73.4

Tubes, Set #3.

Charged @ 200, Discharged @ 150 m-a.

	Charged 2 hrs	3 hrs	4 hrs	5 hrs	6 hrs	7 hrs	10 hrs
5612	372	500	641	723	805	837	935
13	386	523	677	757	847	867	973
14	381	515	658	743	825	857	946
5615	371	478	615	692	762	792	925
16	375	496	462	542	672	810	972
17	377	505	652	740	827	861	967
5618	372	501	635	717	797	820	897
19	377	497	642	712	786	817	893
20	370	491	617	698	756	790	860
5621	380	508	646	723	800	822	887
22	378	516	662	742	812	845	895
23	382	518	663	737	802	820	863
5624	345	440	547	617	645	711	807
25	345	437	548	620	677	717	797
26	345	445	555	625	692	725	837

	Charged (Discharged) 1 hr	Charged 6½ hrs @ 150	5 hrs @ 200	4 hrs @ 250	3½ hrs @ 300
963		783	723	697	648
942		802	757	737	717
975		793	743	716	676
987		762	692	661	612
986		550	542	655	707
1008		795	740	707	670
935		775	717	696	657
930		777	712	695	647
927		748	698	663	628
910		782	723	701	655
928		792	742	718	680
892		785	737	717	685
977		550	617	582	548
977		665	620	587	547
1011		682	625	595	552

Set #3. After 50 Hot Runs.

	Capacity in Amp-hours	Discharge Curve 7½ % Discharge	Charged 6 3/4 hrs @ 150 ma	5 hrs @ 200	4 hrs @ 250	3 1/3 hrs @ 300	5 hrs Disch Curve 7½ % Discharge
5612	892	97.7	622	567	547	472	78.5
13	920	97.6	680	650 x	645 x	567 x	85.81
14	920	94.4	656	622	570 x	525 x	84
5615	955	96.7	647	583 x	550 x	450 x	84
16	995	101	562	460	550 x	497 x	84.9
17	1010	100	717 x	672 x	647 x	560	90.9
5618	937	100.2	590	592	603	536	81.2
19	975	104.8	707	663 x	625 x	555	93
20	892	96.3	603	580	550	595	93.
5621	945	103.8	720	673 x	657 x	572	93.
22	967	104.2	650 x	580	625	620	79.
23	930	104	740	710	682	622	96.3
5624	885	90.6	587 x	550 x	522	460 x	89.
25	805	82.4	525	503 x	500	429 x	81
26	860	85	575	512	492	435	82.

Runs marked "x" were bad, low voltage curves. Seems to indicate bad contacts internally.

6/13/07

After 100 Hot Runs.

	Capacity in Amp-hours	Discharge Curve 7½ % Discharge	Charged 6 3/4 hrs @ 150 ma	5 hrs @ 200	4 hrs @ 250	3 1/3 hrs @ 300	5 hrs Disch Curve 7½ % Discharge
5612	915	95	645	590	527	495	81.6
13	900	95.5	692	646	600	575	85.3
14	928	95.1	685	625	577	566	84.1
5615	912	97.4	615	545	475	437	78.7
16	982	99.6	708	632	575	547	116.6
17	960	95.3	695	640	575	565	86.5
5618	920	98.4	697	637	577	537	88.9
19	972	104.5	712	658	597	562	92.3
20	845	91.1	687	642	610	567	92.1
5621	918	100.7	700	655 x	595 x	570	90.6
22	920	99.2	707	620 x	500	590	82.5
23	912	102.2	730	680	617	605	92.2
5624	775	79.3	575	507	450	437	82.2
25	670	68.6	472	422	385	353	68.1
26	650	64.2	450	387	342	325	61.9

Note – #5622 is the only cell which has a bad curve now. The ones that were low in voltage before have all improved.

After 150 Hot Runs

Set #3.

	Conditioned on Overnight		Overnight 16 2/3 hrs @ 150	5 hrs @ 200	4 hrs @ 250	3 1/3 hrs @ 300	
5612	983		673	622	565	502	
13	900		685	652	620	560	
14	967		677	642	605	547	
5615	930		502	525	485	416	
16	972		637	580	527	475	
17	976		660	615	575	510	
5618	940		560	625	590	512	
19	980		665	615	570	495	
20	840		655	625	590	547	
5621	895		672	627	600	550	
22	932		680	640	620	551	
23	875		683	652	622	560	
5624	740		520	472	432	373	
25	642		447	412	377	325	
26	610		418	395	350	302	

After 200 Hot Runs.

	Conditioned on Overnight		Overnight 16 2/3 hrs @ 150	5 hrs @ 200	4 hrs @ 250	3 1/3 hrs @ 300	
5612	910		642	562	527	487	
13	812		653	587	577	550	
14	867		682	602	572	540	
5615	882		617	530	495	452	
16	912		650	545	500	465	
17	900		645	563	520	477	
5618	897		680	585	557	505	
19	932		682	595	548	510	
20	805		635	555	522	480	
5621	847		670	596	555	520	
22	830		655	577	535	495	
23	818		667	590	560	530	
5624	717		510	452	430	390	
25	712		505	450	427	387	
26	583		427	375	342	312	

Julius, Set #4.

Charged @ 200, Discharged @ 150 m-a.

	Charge 7 hrs	3½ hrs	4 hrs	5 hrs	6 hrs	7 hrs	10 hrs	Correction (Bottom Curve)	Correction (Top Curve)	Charged @ 150	5 hrs @ 200	4 hrs @ 250	3½ hrs @ 300	
5876	382	495	610	720	793	830	.943	1.080	1.10	790	720	700	652	27 m.-h.a.m.
77	392	506	625	742	813	867	.970	1.126	"	822	742	720	687	"
78	365	475	587	700	765	823	.932	1.117	"	785	700	671	625	"
5879	400	525	646	767	837	900	.970	1.165	1.137	842	767	743	702	25 m.-h.a.m.
80	400	522	632	756	832	882	.995	1.167	"	837	756	721	685	"
81	393	516	628	756	832	882	.997	1.180	"	835	756	721	685	"
5882	400	543	658	782	867	920	1.025	1.130	1.157	860	782	743	697	23 m.-h.a.m.
83	393	515	623	743	817	867	.967	1.090	"	820	743	702	668	"
84	395	518	622	740	815	867	.972	1.082	"	820	740	702	668	"
5885	390	518	630	745	825	875	.995	1.082	1.177	820	745	700	650	21 m.-h.a.m.
86	396	536	652	775	860	920	1.025	1.122	"	850	775	731	688	"
87	400	536	647	765	843	900	1.012	1.120	"	838	765	722	688	"
5888	396	542	661	783	870	932	1.050	1.162	1.20	857	783	731	691	19 m.-h.a.m.
89	398	535	650	771	863	922	1.050	1.150	"	857	771	715	690	"
90	391	538	661	775	862	923	1.067	1.150	"	843	775	717	672	"
5891	373	520	623	722	812	873	1.030	1.135	1.242	815	722	670	647	17 m.-h.a.m.
92	397	557	680	801	890	950	1.100	1.185	"	862	801	740	700	"
93	397	546	666	773	865	925	1.070	1.167	"	850	773	712	683	"
5894	393	527	642	750	841	907	1.068	1.170	1.222	837	750	700	648	15 m.-h.a.m.
95	397	557	690	807	907	962	1.100	1.242	"	830	807	662	702	"
96	385	532	645	751	840	982	1.067	1.155	"	832	751	675	637	"
5897	398	541	662	770	865	927	1.073	1.170	1.227	850	770	710	670	13 m.-h.a.m.
98	398	533	662	763	857	917	1.075	1.175	"	837	763	700	640	"
99	398	540	657	751	850	910	1.070	1.187	"	822	751	685	662	"

Set #4.
After 50 Hot Runs

	Capacity on Overhang	Overhang Capacity 71°F & 0 Humidity	Charged 6 3/8 Run @ 150 m.v.	5 Run @ 200.	4 Run @ 250.	3 1/3 Run @ 300.	5 Run Over Cap. 71°F & 0 Humidity
58 76	850	78.6	68.2 x	607	517	477	84.4
77	995	88.4	72.0	580	572	592	78.1
78	1050	94	73.2 x	642	581	547	91.8
58 79	1042	89.6	72.5 x	637	581	550	83
80	1067	91.4	72.7 x	637	577	545	84.3
81	1050	89	75.5	690	647	622	91.3
58 82	1132	100	78.7	717	660	612	91.7
83	1032	95.6	72.8	672	607	575	90.6
84	1050	97	74.0	695	607	592	93.9
58 85	1012	93.6	66.7	600	552	500	80.6
86	1102	98.2	75.0	680	630	595	93.7
87	1017	90.8	67.5 x	612	567	550	80
58 88	1115	96.9	76.5	685	622	586	87.5
89	1117	97.1	76.7	692	630	586	89.8
90	1092	95	73.0 x	675	622	585	87
58 91	1080	95.2	70.3	682	575	548	87.6
92	1150	97	77.0	640	510	572	78.9
93	1142	98	76.6	687	617	577	89
58 94	1150	98.3	74.5	650	592	550	84.6
95	1180	97.4	77.2	705	555	581	87.3
96	1127	97.6	74.5	672 x	598	568	89.5
58 97	1110	98.9	72.2	485	327	566	63
98	1110	97.5	82.2	760	700	665	97.7
99	1187	100	80.5	773	662	620	96.3

After 100 Hot Runs

	Capacity on Overhang	Overhang Capacity 71°F & 0 Humidity	Charged 6 3/8 Run @ 150 m.v.	5 Run @ 200.	4 Run @ 250.	3 1/3 Run @ 300.	5 Run Over Cap. 71°F & 0 Humidity
58 76	892	82.6	62.5	530	461	443	73.6
77	947	86	65.5	575	507	490	77.4
78	995	89.1	67.0	587	525	491	83.9
58 79	1007	86.4	66.5	585	525	502	76.2
80	985	84.4	61.5	552	500	470	73.1
81	1045	88.5	69.0	610	545	518	80.7
58 82	1096	96.9	71.2	637	571 x	542 x	81.4
83	1007	93.2	65.7	307	300 x	438 x	41.3
84	1050	98.8	69.0	620	385	338	83.8
58 85	950	87.7	63.5	567	501	471	76.2
86	1096	97.5	73.0	660	591	561	85.1
87	970	86.6	63.0	570	510	480	74.5
58 88	1082	93.2	71.2	640	577	543	81.8
89	1097	95.3	70.7	625	555	517	81
90	1080	93.9	70.5	622	553	517	80.3
58 91	1077	94.8	70.0	627	543	510	86.9
92	1147	98.4	75.7	692	627	586	86.4
93	1140	97.8	71.5	645	576	537	83.5
58 94	1140	97.4	71.0	672 x	547 x	510 x	83
95	1173	96.8	73.5	500 x	527 x	617 x	61.9
96	1125	97.4	69.7	625	553	518	83.2
58 97	1160	99.1	73.7	671 x	597 x	560	87.1
98	1087	97.5	67.5 x	727	605 x	648	95.4
99	1137	100	74.0	672	605	560	89.5

Set #4.
After 150
Hot Runs.

	Conductivity on Overshot	Conductivity Corrected to 71° F. Overshot	Changed 6 2/3 Bus. @ 150 Sec.	5 Bus. @ 200.	4 Bus. @ 250	3 1/3 Bus. @ 300	5 Bus. Clay Carp. 71° F. Overshot	
5876	783	72.4	657	550	445	420	76.4	
77	855	76	660	575	470	432	77.4	
78	835	74.8	672	597	487	457	85.3	
5879	867	74.4	672	582	495	470	75.8	
80	867	74.3	650	547	455	425	72.4	
81	922	78.1	720	605	505	463	80.	
5882	1002	88.8	747	645	545	505	82.4	
83	925	85.6	730	645	545	507	86.9	
84	953	87.9	747	650	552	515	87.8	
5885	885	81.6	650	555	465	425	74.5	
86	1020	90.8	742	656	562	525	84.6	
87	912	81.5	650	555	475	437	72.6	
5888	1011	87	725	647	557	520	82.7	
89	1035	90	747	642	548	512	83.3	
90	1007	87.5	725	617	527	487	79.7	
5891	1025	90.3	722	617	530	490	86.5	
92	557	49	550	623	651	626	77.9	Sour V.
93	1080	92.6	737	642	565	518	83.1	
5894	1067	91.1	750	653	557	505	87.	
95	1090	89.8	812	722	646	610	89.5	
96	1057	91.4	750	648	550	513	86.2	
5897	1103	94.4	780	680	600	570	93.3	
98	1108	94	792	712	615	575	93.4	
99	1110	93.6	792	712	625	592	94.8	

After 200
Hot Runs

	Conductivity on Overshot	Conductivity Corrected to 71° F. Overshot	Changed 6 2/3 Bus. @ 150 Sec.	5 Bus. @ 200	4 Bus. @ 250	3 1/3 Bus. @ 300	5 Bus. Clay Carp. 71° F. Overshot	
5876	697	64.6	581	480	431	400	66.6	
77	692	61.5	537	498	447	405	67.	
78	680	60.9	400	350	350	370	50	
5879	780	66.9	600	518	460	425	67.5	
80	762	65.4	582	485	425	395	64.1	
81	900	76.2	678	585	517	467	77.4	
5882	970	85.8	697	590	525	483	75.4	
83	928	85.1	653	568	512	480	76.4	
84	920	85	666	590	527	491	79.7	
5885	830	76.6	585	495	425	400	66.4	
86	1000	89	722	613	542	507	79	
87	825	73.6	580	497	427	397	65	
5888	1010	86.8	677	592	525	476	78.7	
89	1010	87.8	670	569	507	467	73.7	
90	997	86.6	655	561	498	466	72.4	
5891	1012	89.2	675	573	508	465	79.3	
92	947	79.9	592	545	541	552	68	
93	1082	92.9	680	617	552	522	79.9	
5894	1082	92.6	686	620	558	522	82.6	
95	1045	86.1	725	652	590	592	80.8	
96	1047	90.6	788	623	555	507	82.9	Cut
5897	1047	89.4	707	580	527	567	75.3	
98	975	83	550	583	527	592	65.9	
99	1026	86.4	477	495	585	567	65.8	

Tubes, Set #5.

Charged @ 200, Discharged @ 150 m-a.

	Charged 2 hrs.	3 hrs.	4 hrs.	5 hrs.	6 hrs.	7 hrs.	10 hrs.
5992	391	561	691	797	890	948	1062
93	391	562	693	798	893	962	1067
94	396	575	711	822	917	987	1080
5995	370	540	677	778	862	937	1042
96	373	542	683	785	867	942	1045
97	372	541	687	786	872	942	1052
5998	358	495	650	746	830	900	1015
99	355	486	645	736	825	902	1018
6000	340	475	622	715	797	872	1001
6001	393	575	738	841	942	950	1021
02	386	563	720	821	920	912	1007
03	392	570	735	841	937	947	1012
6004	375	555	708	817	910	940	1001
05	386	573	742	861	960	987	1040
06	390	575	750	865	970	975	1050
6007	381	567	730	840	935	965	1020
08	381	566	731	842	940	967	1032
09	382	568	741	857	950	972	1035

	Charged 6 hrs @ 150	5 hrs @ 200	4 hrs @ 250	3½ hrs @ 300	
1162	887	797	788	722	21 g. KOH + 2 g. SiO2
1157	887	798	790	740	" "
1145	901	822	816	770	" "
1125	872	778	748	690	17 g. KOH + 2 g. SiO2
1120	875	785	757	700	" "
1120	885	786	770	717	" "
1100	852	746	727	665	13 g. KOH + 2 g. SiO2
1115	852	736	720	662	" "
1100	830	715	700	647	" "
1136	937	841	830	800	21 g. NaOH + 2 g. SiO2
1110	932	821	821	770	" "
1137	935	841	821	790	" "
1100	903	817	816	750	17 g. NaOH + 2 g. SiO2
1170	932	861	830	813	" "
1177	940	865	830	805	" "
1130	907	840	818	765	13 g. NaOH + 2 g. SiO2
1142	912	842	820	757	" "
1125	925	857	822	786	" "

Note. 2 g. SiO2 means this amount to each cell of 175 cc.

Set #5. After 50 Hot Runs.

	Compression on Connecting Rod	Connecting Rod 71° % Compressed	Chord 6 3/4 Bus @ 150 Pounds	5 Bus @ 200	4 Bus @ 250	3 1/2 Bus @ 300	5 Bus Chg. Cap. 71° % Compressed
5997	1176	101	787	747	662	632	93.8
98	1222	105.7	801	782	725	698	98.1
99	1225	107	795	775	600	622	94.3
5995	1180	104.8	793	747	667	645	96.1
96	1162	103.8	792	750	657	637	95.6
97	1165	104	796	752	685	662	95.7
5998	1137	103.2	765	712	647	605	95.5
99	1147	103	757	705	675	590	95.8
6000	1125	102.2	725	677	585	562	94.7
6001	1227	108	855	795	687	782	94.5
02	1225	110.3	910	880	775	817	107
03	1295	114	945	932	837	855	110.8
6004	1250	113.6	897	877	800	787	107.2
05	1275	109	905	880	807	782	102.1
06	1325	112.6	917	907	832	842	104.9
6007	1168	103.2	847	800	722	706	95.2
08	1166	101.9	844	782	715	703	97.9
09	1161	103.2	837	787	720	705	91.8

After 100 Hot Runs.

	Compression on Connecting Rod	Connecting Rod 71° % Compressed	Chord 6 3/4 Bus @ 150 Pounds	5 Bus @ 200	4 Bus @ 250	3 1/2 Bus @ 300	5 Bus Chg. Cap. 71° % Compressed
5997	1117	95.7	780	717	655	627	90
93	1202	104	820	780	727	700	97.8
94	1192	104.2	827	793	747	722	96.4
5995	1165	103.6	817	767	697	655	98.7
96	1120	100	782	735	670	630	93.6
97	1142	102.1	792	750	700	662	95.4
5998	1102	100.1	757	705	652	612	94.5
99	1111	99.7	752	701	640	603	95.3
6000	1110	100.9	737	670	605	565	93.7
6001	1115	98.2	842	833	812	805	98.9
02	1242	109.2	887	850	812	785	103.4
03	1162	102.3	887	855	862	837	101.7
6004	1252	113.9	882	825	780	757	101.
05	1315	112.3	891	848	820	800	98.4
06	1325	112.7	900	830	790	767	94.
6007	1102	97.6	812	752	710	680	89.6
08	1117	97.6	817	782	735	720	97.9
09	1075	95.5	767	607	560	535	70.8

Set #5. After 150 Hot Runs.

	Connection on Crankshaft	Crankshaft Oil Pressure 7# ⅝ Orifice	Cleaned 6⅞ Bore 150 min.	5 Bore @ 700	4 Bore @ 750	3⅓ Bore @ 300	5 Bar Clutch Center 7# ⅝ Orifice
5997	1025	88.1	742	670	621	591	84
98	1140	98.6	805	745	717	667	93.4
99	1157	101	825	772	735	695	94
5995	1077	95.7	777	717	692	646	92.2
96	1035	92.4	750	687	637	598	89.6
97	1035	92.4	763	705	675	625	89.7
5998	1000	91	732	450	610	608	90.3
99	1015	91	705	645	646	583	87.6
6000	1015	92.3	730	647	615	572	90.5
6001	750	66	650	637	645	622	75.8
02	782	70.5	667	641	655	611	78
03	750	66	660	652	662	635	77.5
6004	1175	102.2	705	532	567	568	65.1
05	1150	98.3	760	658	685	656	76.3
06	1210	102.8	680	495	527	545	57.2
6007	920	81.4	680	625	611	590	74.4
08	950	83	685	625	612	608	74.2
09	900	80	682	625	589	572	72.9

After 200 Hot Runs.

	Connection on Crankshaft	Crankshaft Oil Pressure 7# ⅝ Orifice	Cleaned 6⅞ Bore 150 min.	5 Bore @ 700	4 Bore @ 750	3⅓ Bore @ 300	5 Bar Clutch Center 7# ⅝ Orifice
5997	1023	88.2	702	652	616	570	81.8
98	1115	96.5	787	732	707	660	91.8
99	1132	99	807	765	728	687	93
5995	1052	93.6	745	692	675	647	89
96	1022	91.4	738	675	621	585	86
97	1020	91.1	740	687	645	612	87.5
5998	977	88.8	700	652	607	575	87.5
99	990	88.8	692	652	612	580	88.6
6000	992	90.2	652	642	600	550	89.8
6001							
02							
03							
6004							
05		Cut Out					
06							
6007							
08							
09							

Set #5. After 250 Hot Runs.

	Capacitance on Oneohm Unit		Charge 6½ hrs. @ 150 mas.	5 hrs @ 200	4 hrs @ 250	3½ hrs @ 300		
5992	900		680	607	565	550		
93	1110		821	742	697	670		
94	1120		825	757	720	696		
5995	1041		748	692	665	645		
96	992		731	662	607	587		
97	987		745	682	635	610		

Cells #5992 - 6000 are Cut Out.

After 300 Hot Runs.

	Capacitance on Oneohm Unit			Charged 5 hrs @ 200			
5992				622			
93				745			
94				772			

1/10/08

Tubes. Special Electrolytes.

	Electrolyte	Chg'd 15 hrs. @ 300 Discharg'd @ 200. 1	2	3	4	5	Chg'd 6 hrs @ 200 Discharg'd @ 200 6	7	8	Chg'd 7 hrs @ 200 Discharg'd @ 200 9	10	11	Average Run 12
8701	21 g. KOH	973	1143	1187	1187	1183	847	810	807	877	867		1133
02	"	990	1171	1207	1193	1200	855	830	827	893	887		1155
8703	24 g. KOH	983	1158	1180	1160	1163	848	820	817	883	880		1113
04	"	1040	1220	1227	1195	1203	883	850	841	920	907		1158
8705	27 g. KOH	988	1152	1155	1140	1137	833	793	793	867	845		1075
06	"	991	1150	1157	1141	1138	837	796	795	870	843		1067
8707	21 g. KOH + 2 g. Li_2SO_4	1010	1200	1205	1195	1193	931	901	898	970	963		1217
08		1035	1191	1235	1181	1190	930	901	900	971	970		1223
8709	24 g. KOH + 2 g. Li_2SO_4	1041	1190	1207	1180	1207	931	895	891	963	960		1227
10		1015	1180	1188	1165	1187	920	891	887	955	953		1200
8711	27 g. KOH + 2 g. Li_2SO_4	1038	1160	1201	1203	1238	907	883	873	943	943	Special Run for A/C Curve	1191
12		1028	1193	1230	1223	1248	923	890	881	953	951		1223

2/11/08.

Tubes #8701-12.

After 25 Hot Runs.

	Electrolyte	Hot Run (1:00 PM) Chg'd 45 hrs @ 2:00	Chg'd 15 hrs. @ 3:00 Discharg'd @ 2:00				C-45 hrs @ 2:00 D-@ 2:00	C-7 hrs @ 2:00 D-@ 2:00			
			38	39	40	41	42	43	44	45	46
8701	21% KOH	250	1118	1177	1177	1187	833	807	877	863	Special Run for Dr/Curve
02	"	217	1127	1190	1181	1197	837	813	883	870	
8703	24% KOH	227	1103	1138	1140	1128	777	763	827	810	
04	"	253	1127	1183	1173	1167	780	776	838	828	
8705	27% KOH	217	1023	1090	1053	1048	723	698	757	740	
06	"	240	988	1058	1045	1045	720	697	743	727	
8707	21% + 2% SiO_2	420	1377	1338	1310	1307	927	927	987	991	
08	"	387	1365	1328	1293	1293	923	921	983	988	
8709	24% + 2% SiO_2	450	1310	1270	1218	1213	907	897	933	960	
10	"	443	1310	1271	1238	1230	910	900	953	963	
8711	27% + 2% SiO_2	487	1370	1325	1297	1280	903	898	947	947	
12	"	490	1383	1328	1297	1271	900	883	930	937	

After this the cells had 9 runs on 6 hour charges in the cold and also after standing.

See synopsis of these runs in front part of book.

3/30/08.

Tubes #8701 - 12.

After 50 Hot Runs.

	Electrolyte	Changed 15 hrs. at 300. Discharged at 200.								Changed 6 hrs. at 200 Discharged at 200.					Changed 7 hrs. at 200 Discharged at 200		
		81	82	83	84	85		87	88	89	90	91	92	93	94
8701	21% KOH	1193	1187	1191	1200	1200		867	823	775	817	910	759	703	683
02	" "	1193	1193	1200	1213	1213		877	828	786	831	921	776	853	850
8703	24% KOH	1153	1127	1107	1120	1100		776	733	717	740	827	701	753	770
04	" "	1187	1133	1110	1107	1097		790	750	733	753	837	723	746	766
8705	27% KOH	1040	1003	973	987	983		700	677	660	674	740	648	663	671
06	" "	1025	993	973	990	977		680	657	643	657	720	633	647	666
8707	21% + 2% $Si O_2$	1293	1267	1271	1300	1307		917	877	857	880	953	878	904	947
08	" "	1281	1213	1195	1193	1170		850	830	800	818	920	857	867	865
8709	24% + 2% $Si O_2$	1167	1187	1180	1233	1227		900	860	843	857	967	917	917	927
10	" "	1277	1237	1233	1250	1267		913	867	851	868	977	910	900	927
8711	27% + 2% $Si O_2$	1111	983	933	953	980		833	773	770	743	837	801	786	793
12	" "	967	800	733	735	735		672	630	613	610	673	666	646	640

* Stood 2 months after run #91.

6/4/08.

Tubes #8701 – 12.

After 1.00

Hot Runs.

	Electrolyte	Chg'd 15 hrs at 300					Chg'd 6 hrs @ 200 m.a.		Charged 7 hrs. @ 200 m.a.			Mechanical Condition
		147	148	149	150	151	152	153	154	155	156	
8701	21% KOH	1180	1200	1209	1187	1171	837	817	867	880	897	O.K.
02	"	1209	1227	1227	1207	1201	853	837	883	890	910	O.K.
8703	24% KOH	1163	1117	1103	1070	1050	736	690	730	703	750	O.K.
04	"	1095	1033	1003	965	947	650	640	636	640	656	1 Ring broken. Seam opened a little
8705	27% KOH	1003	920	880	860	848	616	580	576	561	583	O.K.
06	"	943	890	917	843	796	583	550	543	520	546	O.K.
8707	21% + 2% SiO_2	1057	1057	1030	973	940	867	857	890	806	833	3 Rings broken. Seam open
08	" "	967	827	780	733	653	663	650	656	588	600	4 " " " Seam wide open
8709	24% + 2% SiO_2	1000	817	750	680	650	661	663	666	590	600	3 " " " " "
10	" "	1047	960	937	918	890	867	853	860	783	815	2 " " Seam opened little
8711	27% + 2% SiO_2	920	807	800	775	763	790	767	770	686	700	Rings O.K. Battery swelled
12	" "	690	183	0	Split – Mix out							

x Quicksilver
o + Silver

Tests of Commercial Solanode Cells to ~~Feb. 12, 1910~~ Jan 1, 1910.
~~(Except tests where weights were not taken)~~

Exp. No.	Type Cell	Gms. CuO	Gms. Zn	Rate	A-H 1030	
729	BSCO #1	658	708	2	382	
730	"	651	702	4	325	
731	"	619	693	6	246.5	
~~732-34~~	~~"~~	~~—~~	~~—~~	~~Spec.~~	~~345(av)~~	See below
820	300 Q-N BSCO	410	642			3½ 14" oxide
897	Edison SS	602	678	3	297.5	
898	" M	680	864	3	369	
901	" Q	295	446	1.5	175	
1074	Edison SS	580	651	1.5	311	
1075	" S	608	690	"	323	
1076	BSCO #1	—	—	"	373	
1231	BSCO #1-Imp	—	—	3	381.5	
1232	BSCO #1	—	—	"	331	
1359	BSCO #1-Imp	—	—	4	356	
732	BSCO #1	—	—	4 a 10 h, rest 14 h.	344	
733	"	—	—	4 a 30 h, rest 2 wks	343	
734	"	—	—	10 h @ 2, 2 " " 10	348	
736	"	—	—	4	333	
737	"	—	—	"	325	Same temp. 7 HOH elec. sp. gr. 1.270
738	"	—	—	"	353	33 of 7 HOH
739	BSCO #3	—	—	"	278	
740	BSCO #1	—	—	"	328	Stand 2 wks before reading
745	Edison P	520	320	½ rate	Total	Should have 555 g. CuO.
807-809	BSCO #1	648	—	3	347	Better Cyl
810-812	"	647	—	"	222	G. D. L. "
818 820	" BSCO (300 Q-N)	410	321	3		Compared w/ Bowles

[ITEM FOUND IN BOOK]

912-920	BSCO #1	Stand 7 cts
928-929	"	Reg. x w. lowered Zincs
958 959	"	7 set of Contract x Solvency Scaf
960-961	"	Stand 7 cat. " " "
965-967	BSCO #1 + 5	3 m 6 x 8 jars w. diff conc Sulp
969, 970	BSCO #19 Sulp	Zn 401 g. Dis @ 4 242 g-11
970	" —	" 323 "
1015-1017	Schwendel, B amp + BSCO #1	1.5 amps

Calculations:

Edison "Q" Zinc $2\frac{3}{4} \times 2\frac{3}{4}$

Total net weight 197 g.

Edison "R" Zinc $3\frac{5}{8} \times 3\frac{5}{8}$

Tot. net. net 354 g.

Edison "SS" 9 improved 6" x 3.3"

401 g. per plate net.

Edison "M" Sulp 6" x 3.3"

462 g. per plate net

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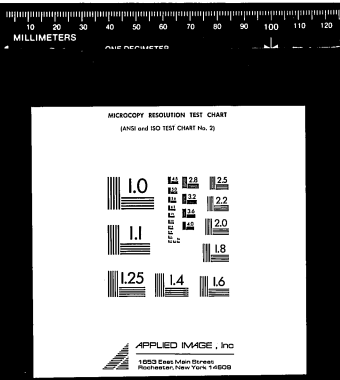
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